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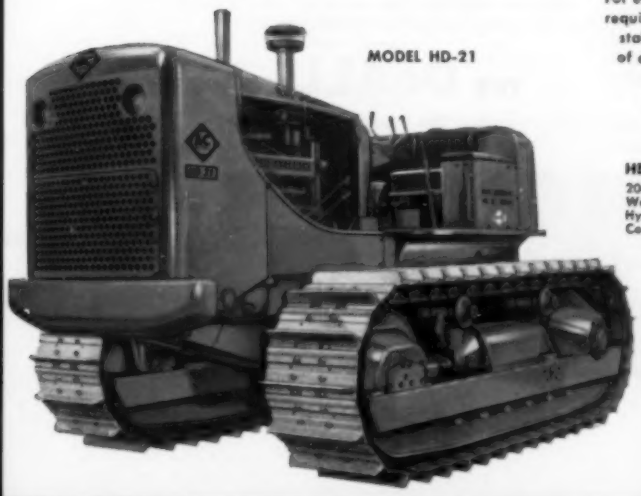

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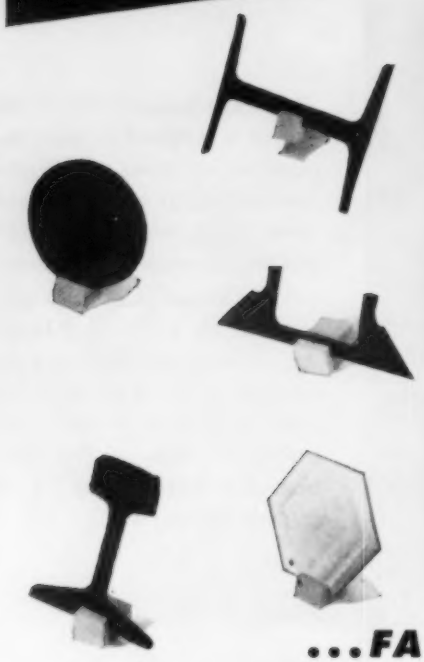

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Management Digest

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Call in your local Burroughs man

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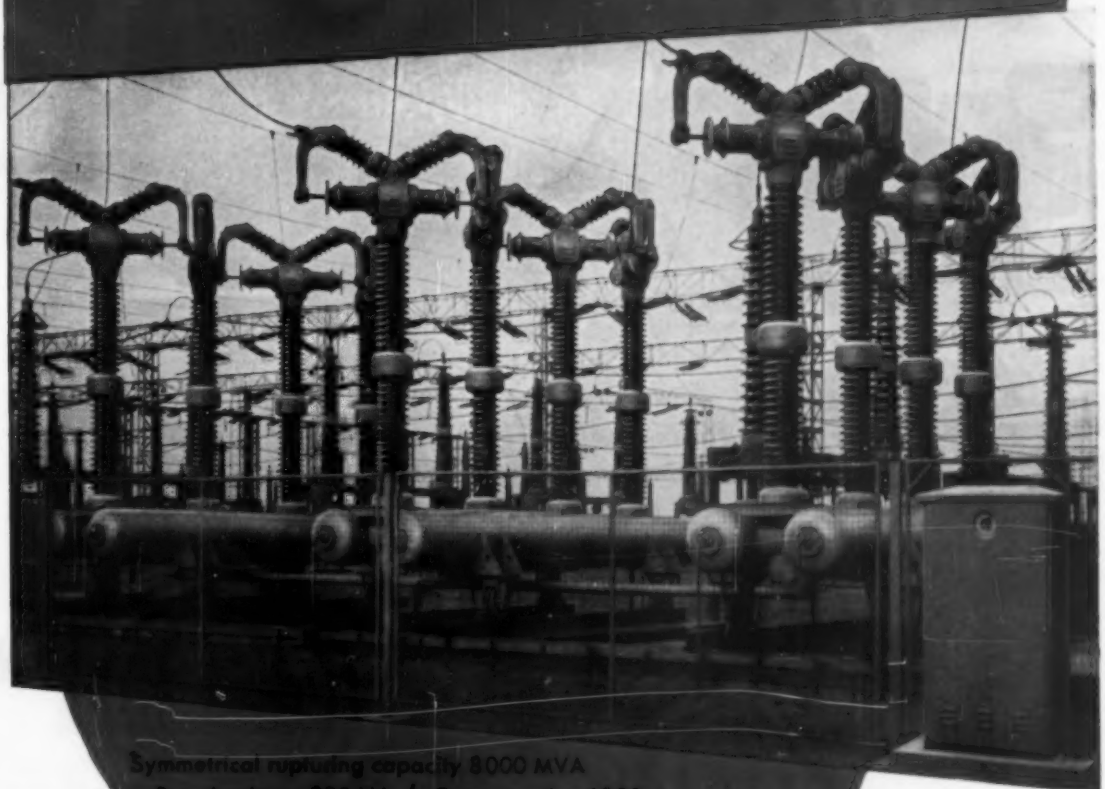

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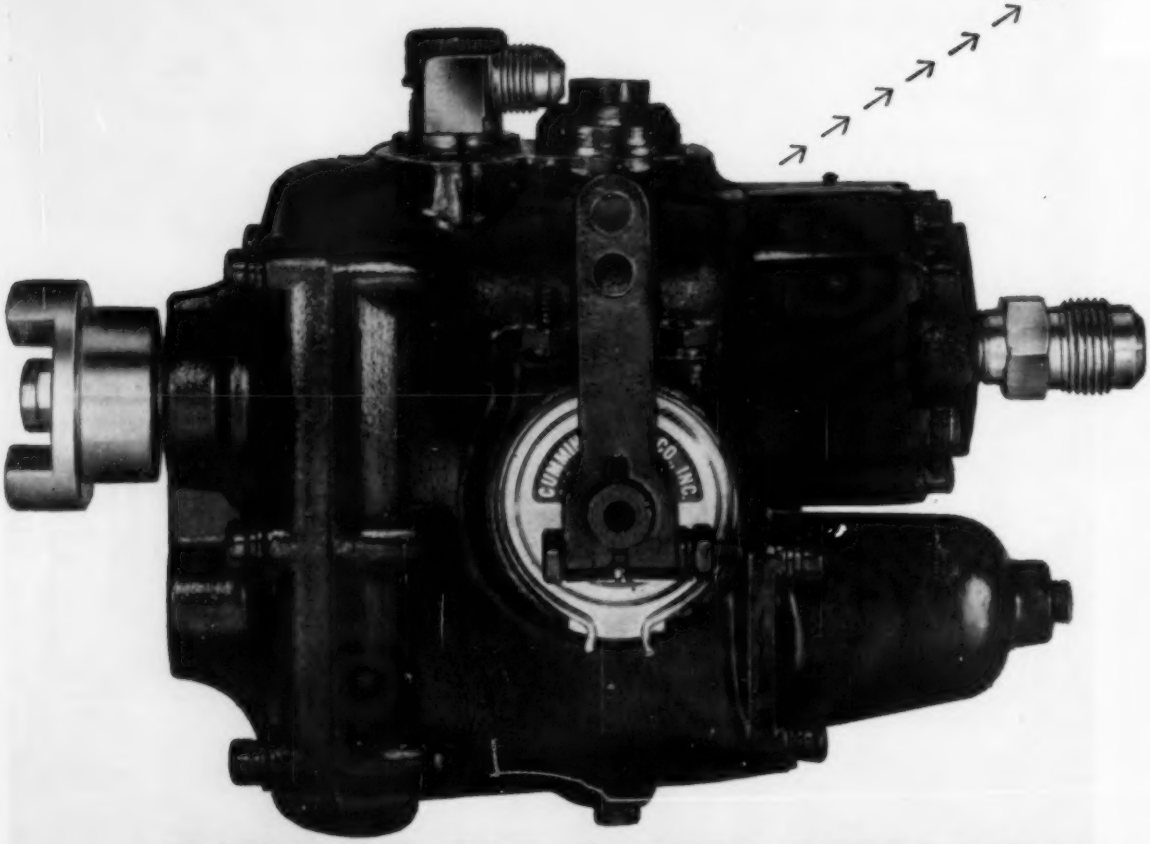

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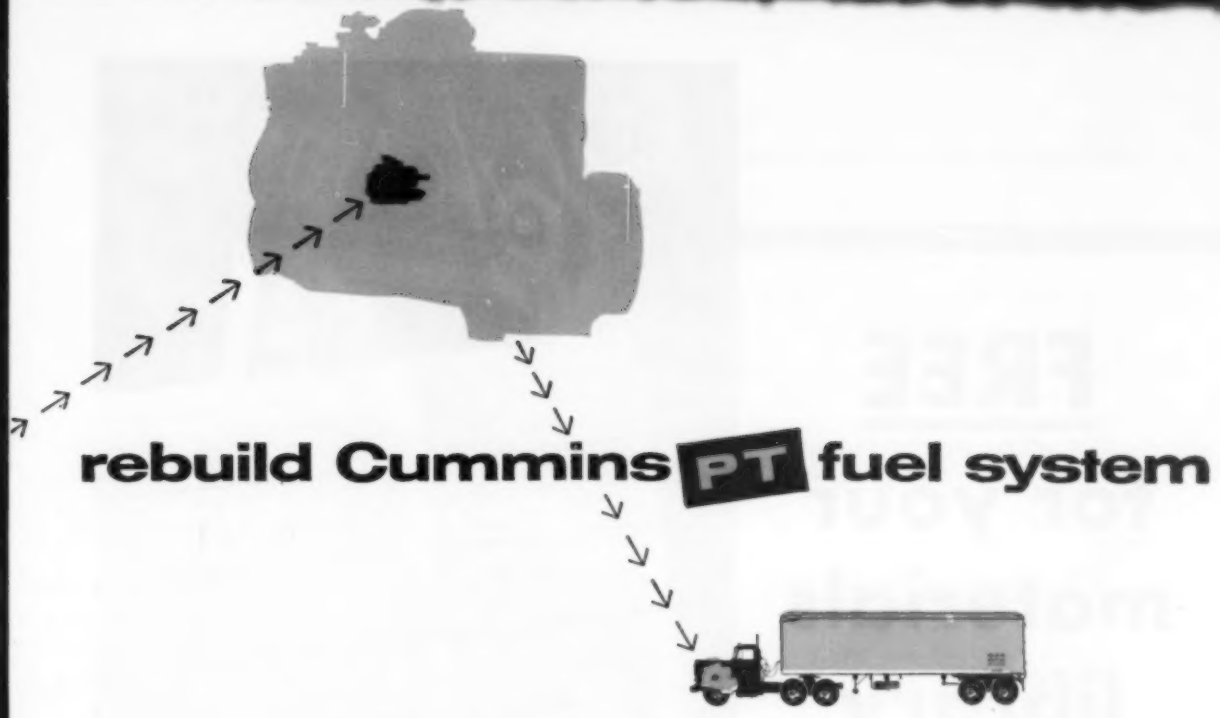

rebuild Cummins PT fuel system

When Transport Lease Co. of Denver, Colorado, overhauled their 300 h.p. Cummins Diesel after 260,000 miles, they also "renewed" their PT fuel system. Here is the record:

	Total Cost	Cost per 1,000 Miles
Rebuild PT Fuel Pump—Parts	**$14.34**	$0.055
Check and rebuild PT Pump Labor—4 hours	$16.00	$0.061
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Total fuel system maintenance cost	$84.34	$0.323

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AA-3

Cummins Diesel Export Corporation
Columbus, Indiana

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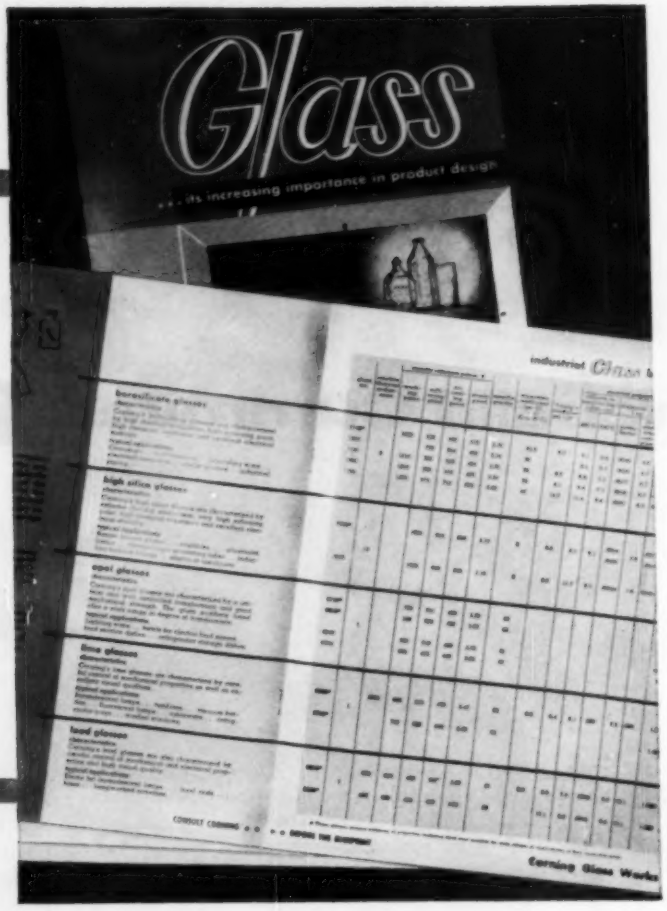

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▶ WORLD TRENDS

WORLDWIDE . . .

International Atomic Energy Agency could help ease world tensions and advance development of the commercial atom. Russia's agreement at the Big Four "summit" conference to join the agency and contribute fissionable materials is a long step ahead. IAEA will now become a worldwide pool of atomic information and materials.

Eight nations—Australia, Belgium, Britain, Canada, France, Portugal, South Africa and the U. S.—are now finishing a working plan and statute for IAEA. As many as 80 nations may join.

WEST GERMANY . . .

The world's third largest steel producer, ranking behind the U. S. and Russia, is now West Germany—not Britain. German steel men say they will turn out 21-million tons during 1955.

Britain, third producer for many years, will be lucky to reach 20-million tons this year. Britain's serious labor strikes in transportation—railroad and ship—are one big reason for her lag behind West Germany.

UNITED STATES . . .

U. S. foreign trade will reach a new peak in 1955. Exports are expected to increase $1.2-billion over 1954 to reach a figure of about $14-billion. Imports are expected to go up $1-billion and hit a new high of $11.2-billion.

The strength of U. S. exports has surprised observers. Big increases have shown up in electrical machinery, iron and steel products, chemical products, and automobiles and parts. Two reasons are given: prosperity in Europe and removal of many trade barriers to the sale of U. S. goods.

MEXICO . . .

One of the best economic years in Mexican history is in the making. Five factors justify optimism in '55:

(1) The historical trend of having gold and dollar reserves drained away during the second quarter has been reversed. (2) A good agriculture year is in prospect. (3) Receipts from tourist trade will reach an all-time high. (4) Foreign investment capital is pouring in. (5) Though imports still exceed exports, the balance of payments position is improved.

Greatest economic fear of Mexican officials is uncertainty about the cotton industry. Competition from U. S. cotton growers is forever a question mark because Washington has no definite agricultural export policy.

JAPAN . . .

Peacetime uses of atomic power are being pursued by Japanese industrial companies. They will step up research now that the U. S.-Japanese atomic energy agreement has been signed.

Leading Japanese firms, anxious to make atomic headway, have concluded technical agreements with major American companies. Japan's government is furnishing research subsidies.

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McGRAW-HILL INTERNATIONAL
Management Digest

SEPTEMBER 1955
VOL. 10—NO. 9

The Americas
$464.8-million sales in 1954, 25 factories; Lever Bros.' soaps and Lipton's teas.
Europe
A $2.5-billion turnover, 69 plants in the U.K. and 105 on the Continent—44 of them in Germany.
Asia
$184.5-million turnover, 15 factories, and plantations on the Solomon Islands.
Africa, Middle East, Australia
$148.5-million turnover, 30 factories.
United Africa Group (dotted area), Unilever's huge trading, processing, growing subsidiary—doing a $759.9-million business with factories (25), plantations, stores, transport, ranches — even cities.

Unilever's World Market

For a Worldwide Empire: Prosperity

Digested from *BUSINESS WEEK*, July 16, p112

A $4-billion business built on food and cleanliness—the fats that people must eat to stay alive, and the soaps to keep them clean—that is Unilever. As more people eat more, and clean themselves more thoroughly, Unilever prospers, pennies at a time. And when you deal in most countries of the world, the pennies mount up.

Few corporations meet more varied customers. Unilever studies, and sometimes despairs of, the whims of U. S. housewives, and the fierce competition of nationwide U. S. advertising. It is encouraged by the birth of a mass consumer market in Europe. It deals with the proud anti-foreign nationalism of a newly independent Asian nation. It trades face-to-face with the awakening millions of black Africa. And it prospers in Latin America as underdeveloped countries grow.

Serving Unilever's world markets is a vast organization. Some 500 companies operating in 50 countries, 250,000 employees in 330 offices and factories make it up. And the organization is still growing:

- New synthetic detergent plants in England, France, Denmark, Finland, Belgium.
- Additions to ice-cream factories in Britain and Germany.
- An oil mill and edible fats plant for Turkey.
- Teabagging machines and a tea packing plant for the U. S.
- Deep sea trawlers for Germany.
- More room for a Filipino soap factory.
- A cargo vessel for the Palm Lines' Africa route.
- A power plant for Port Sunlight, England.

Unilever is immersed in all phases of the fats and oils business—their growth, purchase, processing, transport, manufacture, and distribution. Last-year's gross turnover was £ 1.4-billion—10% above 1953. Unilever companies deal in a wide variety of commodities. Its brands are household words—Rinso, Lux, Lifebuoy, Swan, Surf, Spry, Sunlight, Pepsodent, Bird's Eye (in Britain and Canada), and so on. Atkinson's Perfumes and Britains' Mac Fisheries, largest retail fish chain in the world, are Unilever properties. So is Wall's ice cream, Batchelor's canned peas, a host of creams and powders.

An outstanding feature of Unilever is its bigness. There are two

Unilevers or one, depending on how you look at the organization. Legally, there are two separate holding companies, Unilever Ltd., the British parent, and Unilever, N.V., the Dutch partner. But in policy and management the two are one. In reality, Unilever is one massive organization with two major divisions. The legal semblance of individuality avoids double taxation in Britain and Holland.

Unilever has made some mistakes. Perhaps its biggest occurred just before World War II. It had actually been working on synthetic soaps but decided there was no future in the business. It was not until the war, when a fats shortage developed and the increasing consumer acceptance of detergents became apparent, that Unilever started pushing them. But the delay cost a lot of ground—even now Unilever has not caught up with its competition.

For the future, Unilever will stick to food and cleanliness. It's a field with ample room for expansion, one in which a steady parade of new products and new developments are expected. These prospects probably will make the business more competitive. Unilever's competitors will surely grow both locally and in overseas markets.

That presents odd problems to Unilever. It might want to cut prices to meet an international competitor or it might want simply to lower its prices. Either way small local competitors could be squeezed out of business. Then Unilever would be labeled a foreign monopolistic imperialist. It's a tricky business, but Unilever has handled some tricky situations in the past. It will again in the future.

▶ NEW

Digested from *AMERICAN LETTER*, July 9

World trade will expand steadily in the next 5 years, according to a series of studies just released by the United Nations, World Bank and Monetary Fund. The gain this year will be about 7%. Most progress comes from rises in national output and employment in Africa, Latin America, Middle East, and Western Europe.

WALT DISNEY and friend, Mickey Mouse, ride the rails in . . .

Mr. Disney's Wonderland

Digested from *BUSINESS WEEK*, July 9, p72

Walt Disney is the undisputed king of the animated cartoon industry and his whimsical little friend, Mickey Mouse, is the undisputed king of cartoon characters. These two have made one another famous since 1927. Today their company has a book value of $8,500,000.

But all has not been milk and honey for Walt and Mickey—or should we say milk and cheese? They have been up and down a few times in the past 28 years. At present they are up—higher than ever. Their new Disneyland amusement park, in Anaheim, California, is their latest venture.

Disney is confident that the $17-million carnival park will prove to be a fantastic success—both in the hearts of children and at the box office.

As late as 1940, Walt Disney Productions (Inc.) was in debt $4,500,000. Disney had been producing nothing but movie cartoons. Productions had become more and more expensive to make, and it took a year or two, or even more, to recover costs. The company was short of capital. Then World War II came along and cut the business in half.

After the war the tide of Disney's fortunes began to turn. He soon recaptured his overseas trade. More important, he began to branch out into new activities.

Combination live-action and cartoon films proved successful. Disney started, in 1949, with a series of 30-minute films and graduated to full-length. His latest, The Living Desert, is rivaling Gone With The Wind at European box offices.

Television has become another success, especially to advertise Disney cartoons and feature movies. The Davy Crockett television show has been sensational; merchants of toys and children's wear soon were begging for Crockett merchandise. There will be a Mickey Mouse Club on television soon.

Disneyland promises to be a giant-size tribute to the genius of Walt Disney. It will surely be his most colorful success—if not his biggest in terms of money. Disney and partners will have invested over $10-million—commercial exhibitors an additional $6-million.

The grand show—intended to make fantasy and cartoon adventures a reality for children—has everything from a railroad (five-eighths scale size) to a Peter Pan aerial trip over London. The park covers 62 acres—26 miles from Los Angeles.

P. S. Mickey will be there—with a knowing smile—to view his audience and his achievement. This will be the biggest financial and showmanship year in Disney history.

Are you becoming a paperwork expert instead of an executive? You, too, may make wrong decisions if you have to allow . . .

Too Much Time for Paperwork

Digested from *AMERICAN BUSINESS*, June, p9

Imagine 26 kinds of sales reports prepared within your company—some of them weeks old, others long and hard to interpret. Then imagine conducting a sales conference and battling your way through that mass of paperwork. Finally, imagine discovering that much of the reported information was just an elaborate mass of detail that actually interfered with your making clear-cut executive decisions!

That is exactly what is happening to many executives and many conferences these days. They frequently find that company reports are too numerous, too complicated, too late—and nearly useless, in many cases.

A good example of excessive paperwork is revealed in a recent survey sponsored by the National Records Management Council. Thirty-one types of sales reports were prepared by six large companies. Each firm prepared an average of 26 types. The same information was duplicated in two or three reports. Finally, there was a time lapse of 4 to 30 days for 68% of all reports!

A new formula for management reporting is being explored by a few farsighted executives. They agree on a general approach to the problem, in three steps—with emphasis on consolidation of information and simplicity of reporting. These steps—if worked out as an entirely new method—should give top management the key information it requires, without the burden of needless paperwork:

1. Determine the key factors of the business that contribute to profits. Then set up a system of simplified reports that will enable all members of management to concentrate on those factors. This will focus attention where needed most, and reduce the volume of reporting.

2. Establish a realistic standard of performance for each operation that affects long-term and short-term profits. There are apt to be broad areas, especially in administration, where standards are lacking and no close analysis has been made. Simple reports to measure performance should be drawn up—for all departments.

3. Establish a clear system of reporting that will enable every member of management to readily understand and use reports that measure performance. Strive for directness and simplicity.

Send detailed reports—from the departmental level—to the particular members of middle-management who have direct responsibility. Reports funneled upward to top management should contain just a summary or evaluation of lower-level performance.

Thus, top management receives only information essential to judging over-all operations. Details are kept where they belong—on a lower level.

Results of this approach have been favorable, although the method has been carried out fully in just a few companies.

One corporation that tried the system reduced its schedule of reports from 560 to 140. Reports reaching the company president were cut from 83 to 18!

Most important, the company's president firmly believes that the new system has not only given him more free time for planning and policy making, but has done so without lessening his practical knowledge of company operations.

When You Build a New Plant . . . Think of These Things

Digested from *HARVARD BUSINESS REVIEW*, Mar-Apr, p40

Not long ago, a manufacturer of radio and television equipment built itself a bright, shiny new plant in a small town. The place seemed ideal, as the company saw it. The cost of doing business there looked very low. Everything seemed just right.

But when the company got ready to start the plant, it could not get the kind of employees it needed. The community did not have the social, cultural, and educational assets that employees wanted for their families.

Thus the company had made a costly mistake. In picking the plant site, it had not paid enough attention to deep and important shifts in the nature of personnel. This community might have made a good plant site years before, but times had changed.

And times will keep changing. A good plant site today may not be good tomorrow. A company well situated in 1955 may find itself in trouble, like the radio and television manufacturer, in 1965. The trouble might come from many directions—not only from a change in the nature of personnel, but from changes in transportation, fuel and power supply, water supply, even government policy.

Executives looking for plant sites have to deal with the future just as much as the present; for a plant is a big investment, and it is expected to stand for many years. Here are some of the important changes that may affect plant location thinking in the next 10 years.

I. Personnel

For the past 100 years, machines have played an increasingly important part in manufacturing. The trend is running even more quickly now that automatic equipment is moving into the plants. As a result:

- Industry needs, and will continue to need, fewer hours of human work per unit of output.
- Plant personnel must be more skilled. A plant full of automatic machinery does not need many unskilled laborers; it does not need men to polish metal, for instance, or women to weave fabrics. It does not even need men to operate all its machines—they operate themselves.

What it does need are men to care for the machines, to set up machines and start them operating, and to do various kinds of highly skilled work that the machines cannot do.

What does this mean to the businessman looking for a plant site? It means that, having a big need for highly skilled workers—technicians, engineers—he will have to be sure that his new plant is in or near an attractive community. Skilled workers have been found more reluctant than unskilled workers to move from one town to another. To attract them, a company has to offer a pleasant community—one with good schools and an attractive social and cultural personality.

The company will also have to take a close look at the people already living in the community and near by. They may become employees. Many of them, given time and training, will work up into important jobs. Thus the company needs to find out what kind of people they are before it invests in the expensive plant they will one day work in.

This careful study of the local people will become more and more important in the years ahead. In the past, much building of new plants has gone on in older industrial areas, where the local character was already known and tested. But the trend now is away from these areas, for they are crowded and expensive.

II. Fuel and Power

It seems probable that in the years ahead, industrial plants will move into many areas that they now shun because of poor power and fuel supply.

The possibility of cheap power from nuclear fission is another factor in the plant-site picture. If atomic power is developed to a point where you can set up small power plants anywhere, power supply will not matter much in the picking of factory sites. But the development of atomic power to that point seems at least 10 years away.

III. Water Supply

A certain glass manufacturing plant in an Illinois city cannot flush out its tanks on Mondays. Monday is the housewives' day for doing the family wash.

This is one of the less severe ways in which a shortage of water can bother industry.

Most industrial plants use water in big amounts—some very big. Lack of water is one of the troubles modern industry has most to fear, for a factory can die of thirst just as surely as a man. For that reason, water is high on the list of any businessman looking for a new plant site.

There is plenty of water in the world. The trouble is, it is not always where you want it to be. There are severe shortages throughout the world. In many places, once-great supplies of fresh water are running seriously low, or threaten to run low in the future, because:

- Population is growing.
- In countries where the standard of living is rising, people are using more water per capita. Bathroom showers and washing machines are two examples of devices that come with a high living standard—and that use a lot of water.
- Industry is expanding into areas of the world where water supply is not big. The mouths of rivers were once logical places for new plants, but now overcrowding and high taxation are driving industry elsewhere. Even in the river-mouth regions, where there is plenty of water to be had, water distribution systems are straining hard to keep

up with an ever-growing demand.

This leaves the plant-site seeker with a bad problem. It may be that the site seeker of 1965 will have to resort to expensive solutions, as some companies have done already.

One company, in Texas, built a 28-mile canal to bring water from a river. A utility company is using distilled sea water in its generating plant. A steel company is using treated sewage.

IV. Other Factors

Then there is the question of transportation. This is one of the most pleasant aspects of the site seeker's problem. Since the beginning of industrial history, transportation in many parts of the world has been getting faster, more convenient, more reliable, more widespread. It seems likely that this trend will continue. It means that many parts of the world not good for industrial plants today may be good for industry tomorrow.

Observers put the greatest faith in truck transport for the future. New, better highways are being built. A highway opens up possible plant sites all along its length. It lets a manufacturer ship his products to their markets in one operation.

Other observers put equal faith in other forms of transport. Both rail and air transportation should become more convenient and faster.

One more factor that may loom large in future plant location thinking is government policy. At various times and for various reasons, a government is likely to influence industry's selection of plant sites.

In the U. S., for instance, the federal government has been trying to get companies to build outside areas that might be bomb targets in a future w. . It has also tried to talk companies into building in depressed regions—regions with too much labor and too few jobs, such as some of the coal-mining areas.

The government has not ordered industry to do these things; it has offered tax bargains as an inducement. In future years, both the U. S. government and other governments may do more than that. They may offer bigger bargains. They may even issue orders as to where business may or may not build.

"Work Centers" Improve . . .

. . . Small-Lot Production

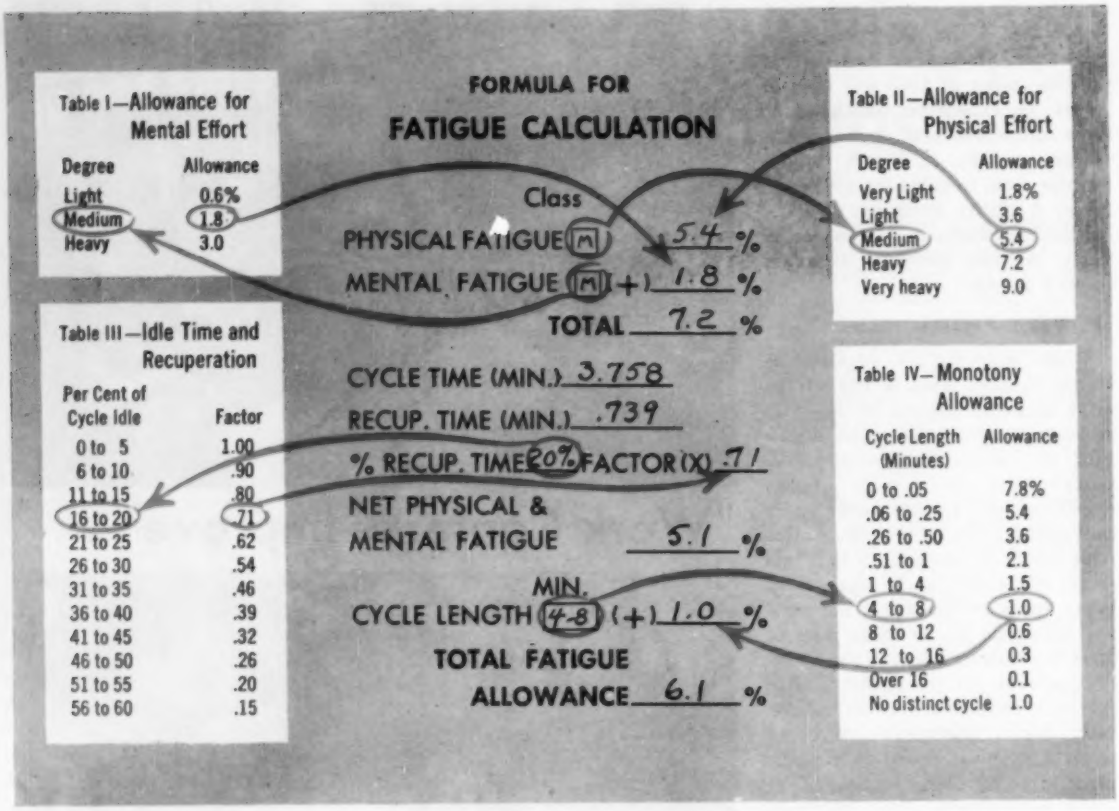
Digested from *FACTORY MANAGEMENT AND MAINTENANCE*, July, p124

Are you using assembly-line methods to produce minor items in small lots each year—just to fill out your catalog of products? If so, consider the "work center" idea developed by Federal Pacific Electric Co. (Newark, N. J.).

Until a year ago, Federal had four or five 20-man assembly lines working on small-lot items. Each line would produce a large supply of a particular item, then shut down on that item and start up on another. The system had proved highly inefficient in terms of both production and the use of available manpower.

Federal decided to break the assembly lines into 14 small work centers—with each team of four to six people working all year on the same product.

Results: (1) Production per manhour has been increased, as much as 20% in some cases. (2) Production scheduling is more efficient. (3) Seasonal hiring is eliminated. (4) Employee earnings are more constant. (5) Morale is higher—absenteeism and turnover are reduced.



Better Way to Figure Fatigue

Digested from *FACTORY MANAGEMENT AND MAINTENANCE*, June, p108

A fatigue allowance that works by formula can be fast and fair to all workers—and reliable. The Dodge Manufacturing Co. (Mishawaka, Ind.) has developed a formula that normalizes earnings on extreme and in-between jobs and gives an allowance for every job. Above all, it is consistent.

The formula (above) is printed on the back of every time study sheet. There is no need to work up original data each time it is used. This is made possible by using the four tables and "benchmark" cards for all operations in the shop.

Each operation is rated according to physical effort and mental effort required: VL—very light, L—light, M—medium, H—heavy, VH—very heavy. Such ratings are called benchmarks.

There is one serious limitation: the job-evaluation system used by the company must weigh working conditions—such as lighting and ventilation—in the base rates.

Four major factors enter into the Dodge formula: physical effort, mental effort, idle time, and job monotony. Allowances for each are totaled to get an over-all fatigue allowance.

Physical effort can be measured more accurately than mental effort. Thus, the physical scale of effort is divided into five degrees. The mental scale has only three. Mental fatigue is valued as being only one-third as important as physical fatigue.

Idle time means, of course, that a worker has time to rest. Therefore, in terms of an allowance for fatigue, idle time is treated as a negative factor. A ratio is set up—idle time divided by cycle time—to express idle time as a percentage.

Monotony speeds fatigue. So an allowance, based on the repetitive rate of the job, is added to the total. The shorter the time cycle of the operation, the more allowance is given for monotony.

Minimum allowances are established. Suppose a worker is idle 50% of cycle time. He should, logically, be subject to little or no fatigue. But it requires some effort merely to stay on the job. So the worker is given a minimum allowance of 2%. It is good for employee relations and morale, if nothing else.

Using the formula can best be explained by an example:

Suppose the operation is drilling metal with a small radial drill. The cycle is 3.758 minutes (from time study). Idle time—or time for recuperation—is 0.739 minutes. Both mental and physical effort required are rated on the benchmark card as Medium. Follow these steps:

1. Enter total cycle time and idle (RECUP.) time on the form, as

indicated—3.758 and 0.739 minutes.

2. Enter "M" (for Medium), from the benchmark card, in the two squares on the form, as shown.

3. Table I shows 1.8% for medium mental effort; and Table II, 5.4% for medium physical effort. Enter these.

4. On the form, add the allowances for physical and mental effort. Total is 7.2%. Enter total.

5. Divide idle time by cycle time. Enter result—20%—as "% RECUP. TIME."

6. In Table III, 20% idle time gives a factor of 0.71. Enter on the form, as shown.

7. Multiply 7.2% (total allowance for physical and mental effort) by the recuperation, or idle-time, factor, 0.71. Enter the result—5.1%—as indicated; this is the net allowance.

8. Total cycle time is between 4 and 8 minutes. Table IV shows a monotony allowance of 1.0% for this range. Enter 1.0% on the form; add it to 5.1%. The total—6.1%—is the total fatigue allowance.

The total allowance for fatigue is added to the regular time-study figure for the job. The result is a realistic and accurate estimate of what should be expected of the average worker.

How To Make Your Messages Sell Harder

Put Them on Tape

Digested from *BUSINESS WEEK*, April 30, p126

Here is a way of sending ideas, instructions, sales messages: It's not a letter or a brochure or a mimeographed sheet—it's a recording of your voice. American companies are trying the idea and liking it. In many cases, they find, the spoken word means much more than the printed one.

The idea has good promise. Here are some of the ways in which business has put it to use:

• Metropolitan Life Insurance Co. has distributed tape recorders to 800 of its field offices. The company is thinking of feeding tapes out regularly from the main office—training messages, sales messages, and other communications from high-echelon executives.

• A big carpet manufacturer calls key dealers on the phone and records their estimates of its product and the market. The conversations, edited, are played back at sales meetings. The company plans to make records of the talks and mail them out to all dealers and salesmen.

• Armstrong Cork Co., instead of using booklets, has some records to tell customers how to lay tile. Home owners swamped dealers with requests for the records. Some 200,000 went like free tickets, and Armstrong's tile sales jumped.

All this is bringing a lot of profitable new business to the companies that specialize in recordings and recording materials. One such company, Gotham Recording Corp. of New York, sees big possibilities in the future. Gotham's president, Herb Moss, says that a record is no more expensive than a good, four-color mailing piece; each costs 15 to 25¢. But the record is more likely to get its message across. Moss says that records are played by 90% of those who receive them, while brochures get the attention of 40%.

As Moss sees it, business records have all sorts of uses. A company might edit the minutes of its annual meeting, record its president's voice reading the shortened version, and mail the records to stockholders.

It might record talks by key staff members and executives, experts on various aspects of business for distribution through industry. This would have the same effect as a big convention of businessmen listening to a speaker—except that the businessmen would not need to travel.

Moss has a feeling that the future of such personal mass communication may lie not in records but in closed-circuit, or private, television. But right now, he believes, television is too expensive. He thinks that, for the present, inexpensive records and erasable tapes will stay in demand.

Quote of the Month

SINCLAIR WEEKS,
U.S. Secretary of Commerce—

"In our system, the manufacturer of machinery and supplies is one of the most effective purveyors of technical know-how."

▶ NEW

Digested from *PERSONNEL*, July, p2

The art of listening—especially listening to employees—has been much neglected by businessmen. Great effort is put into employee communications to get the worker to listen. But who seems to care about listening to the worker?

The American Management Association decided to research the problem recently. As a result, AMA started a course of instruction called Executive Communication.

The program has been attended thus far by executives from over 100 companies. Class members are taught: (1) to recognize and allow for their individual mental attitudes that tend to block them from intelligent listening and (2) the art of listening as developed by practical exercises. One idea: before speaking in a debate, the class member must first summarize what was said by the previous speaker!

Though few companies give listening training, a fair number stress it as part of the training for employee counseling, interviewing, and work in general communications.

1. Today's sources of power for generating electricity are these:

3. Tomorrow's nuclear power plant basically will operate like this:

Here are four types of reactors that look good now.

1. Pressurized water flows through the reactor, picks up heat from the fission of fuels. High pressure keeps that water from boiling. The heat passes through an exchanger, makes steam from other water. The steam drives a turbine-generator.

2. A homogeneous reactor has a continuous fuel system, instead of one arranged in lumps in the reactor. A solution of a fuel and a liquid also carries heat to steam generators, much like the pressurized water method.

Digested from *BUSINESS WEEK*, June 18, p50

Nuclear Power Reactors . . .

Most producers of electricity, for years in the future, will find coal and oil and water the cheapest and most practical sources of power. But the time has come when atomic power should, at least, be considered before a new generating plant is built.

A power company in the U. S. today—and probably in many other nations before long—can take its choice of four principal types of reactors: (1) pressurized water, (2) homogeneous, (3) liquid metal cooled, and (4) boiling water. All

3. Liquid metal can replace pressurized fluid or solutions of fuel as a heat carrier. It has a very high boiling point, doesn't need high pressures. But sometimes it is difficult to handle.

4. Direct boiling is simple. Steam forms in the heart of the reactor, goes directly to a turbine. So it eliminates in-between heat exchangers, which have heat losses. But direct boiling hampers reactor chain reaction. One improved system of G.E. smooths that out.

Now There Are Four Types

are available from private companies.

The four types differ from one another in the way heat is taken from the reactor core to produce steam, as explained above. All types are connected to ordinary electric generators.

• **Design**—A nuclear reactor is not designed to replace all the equipment of a present-day power station. In a thermal plant, it replaces only the steam boiler. Nuclear fuels replace other fuels.

A reactor and turbogenerator

must be designed to fit exact operating conditions. There are no "standard models" developed, as yet. Manufacturers must first get practical operating experience.

• **Fuel**—First, there is uranium-235. It is the only natural material that can "fission" to produce atomic power by itself. Uranium-233 and plutonium-239 also fission, but these are man-made.

They can be made, it happens, in the same sort of reactor that is used for power production. Thus, a reactor operator can expand his fuel supply with the raw material from which U-233 and P-239 are produced. This material is the so-called "fertile fuel," uranium-238.

The speed of the fission process (the rate at which the neutrons travel in the reactor) determines the size of the fuel load a reactor needs in order to be self-sustaining. Thermal reactors—the ones with which industry has had the most experience—have low neutron speeds. They need a big supply of relatively cheap fuel.

At the other extreme, a fast reactor uses a small amount of expensive fuel. A reactor manufacturer will pick the fuel, or a combination of fuels, to get the greatest economy possible.

• **Most Popular**—Of the four types, the pressurized-water reactor is the most widely used in industry (see item 1 beneath drawing). Four such reactors are now being built in the U. S.—three for permanent power plants, one for portable field service.

To date, the pressurized-water reactor has one major advantage: It is a safe unit that has been well tested in the laboratory and in the field. It has been used successfully for the submarine Nautilus, where the turbine unit is like the kind used in a power station.

Chief disadvantage: It is very costly because of the heavy equipment needed for the pressurized-water unit.

Leading U. S. companies in the power reactor business are Westinghouse, General Electric, Babcock & Wilcox, American Machine & Foundry, North American Aviation, Foster Wheeler, Combustion Engineering, Bechtel, Stone & Webster, Vitro.

WHO'S WHO IN MOLYBDENUM CHEMICALS

Molybdenum ore is taken from the ground as a primary product or a by-product of copper and tungsten ores by:

Kennecott Copper
Phelps Dodge
Climax Molybdenum
Molybdenum Corp. of America
U.S. Vanadium (division of Union Carbide)
Miami Copper
Bagdad Copper

The ore (chiefly molybdenum sulfide) is sold in its crude form, as a concentrate, or roasted to molybdic oxide and sold to companies that produce molybdenum chemicals. The most important of these—sodium molybdate, ammonium molybdate and pure molybdic oxide—are made by:

J. T. Baker Chemical
Molybdenum Corp. of America
North Metal & Chemical
Climax Molybdenum Co.
S. W. Shattuck Chemical Co.

About 14 additional firms synthesize a number of compounds—halides, oxyhalides, sulfides, selenides, carbides, borides, silicides, thiomolybdates, molybdates complex acids, and higher oxides—in limited quantities.

Digested from *CHEMICAL WEEK*, Apr. 23, p44

This Ore May Have More Uses

Molybdenum, which has always been largely in the field of metallurgy, is now edging slowly into chemistry. It has managed to gain itself a place in catalysts, colors, and agricultural products. In April, to give the trend official recognition, Climax Molybdenum Co. set up a new division that will probe molybdenum's further possibilities.

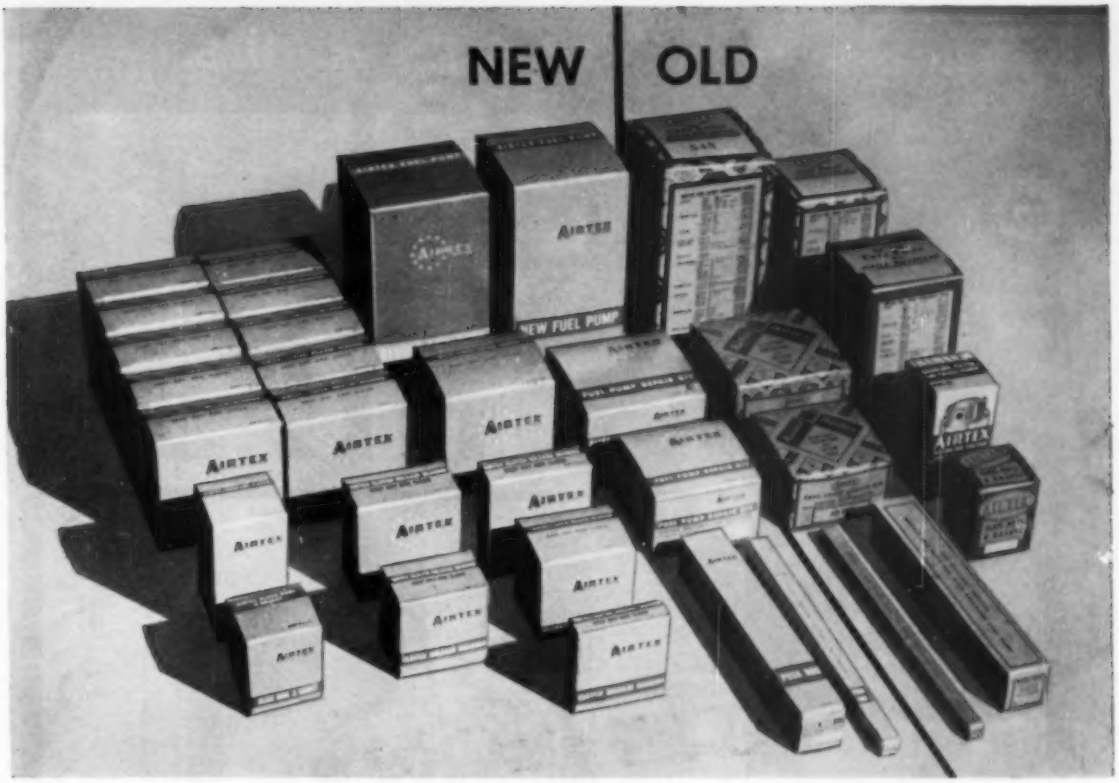
Speculation on what Climax's new division might find is just that—pure speculation. But there are some interesting guesses. It's thought that molybdenum can be put to work in, for instance, photographic chemicals; pigments that will stop corrosion of metals; photoelectric cells; and surface treatments for cotton, paper, and wood.

Climax hopes that it will not be alone in the search for molybdenum's uses. The company will start a publicity campaign to get potential customers interested in similar research.

Other molybdenum producers, in general, have not put much effort into research on the element. That's because molybdenum is a sideline business with nearly all companies that take it out of the ground. Climax, however, has built its business around molybdenum. New, important uses for the element will mean a better business setup for the company.

In probing molybdenum's chemical uses, Climax also has diversification in mind. At present, the company is almost totally dependent on the alloy steel industry, its major customer. The chemicals industry has proved more stable than steelmaking, and a going business in chemicals would make Climax's business smoother.

The company's regular research places emphasis on established molybdenum applications — catalysts, lubricants, colors, and agricultural chemicals. So Climax looks upon its new research program as a venture in technical testing. There is no way of telling what the results will be. But if they are good, it will mean a great deal to many industries—and Climax.



NEW AND OLD groupings of typical parts show modernization achieved with new family package design.

Family Packaging Sells the Whole Line

Digested from *MODERN PACKAGING*, June, p134

You can apply family package-design treatment to industrial products as well as to foods, drugs, and other consumer items. That is the experience of Airtex Automotive Div., Airtex Products, Inc. (Fairfield, Ill.).

The division turns out a variety of automotive parts ranging from fuel pumps and water pumps to tie rod ends and hydraulic brake parts. Another division, Master Parts, has a parallel line but reaches a different competitive market. Both lines had their packages redesigned with identical principles but distinctly different, non-conflicting design themes.

Airtex's old packages presented a confusing array of design and color combinations. Some had a symbolic drawing of the package's part; others did not. No trademark or strong identifying characteristics pulled the whole line together.

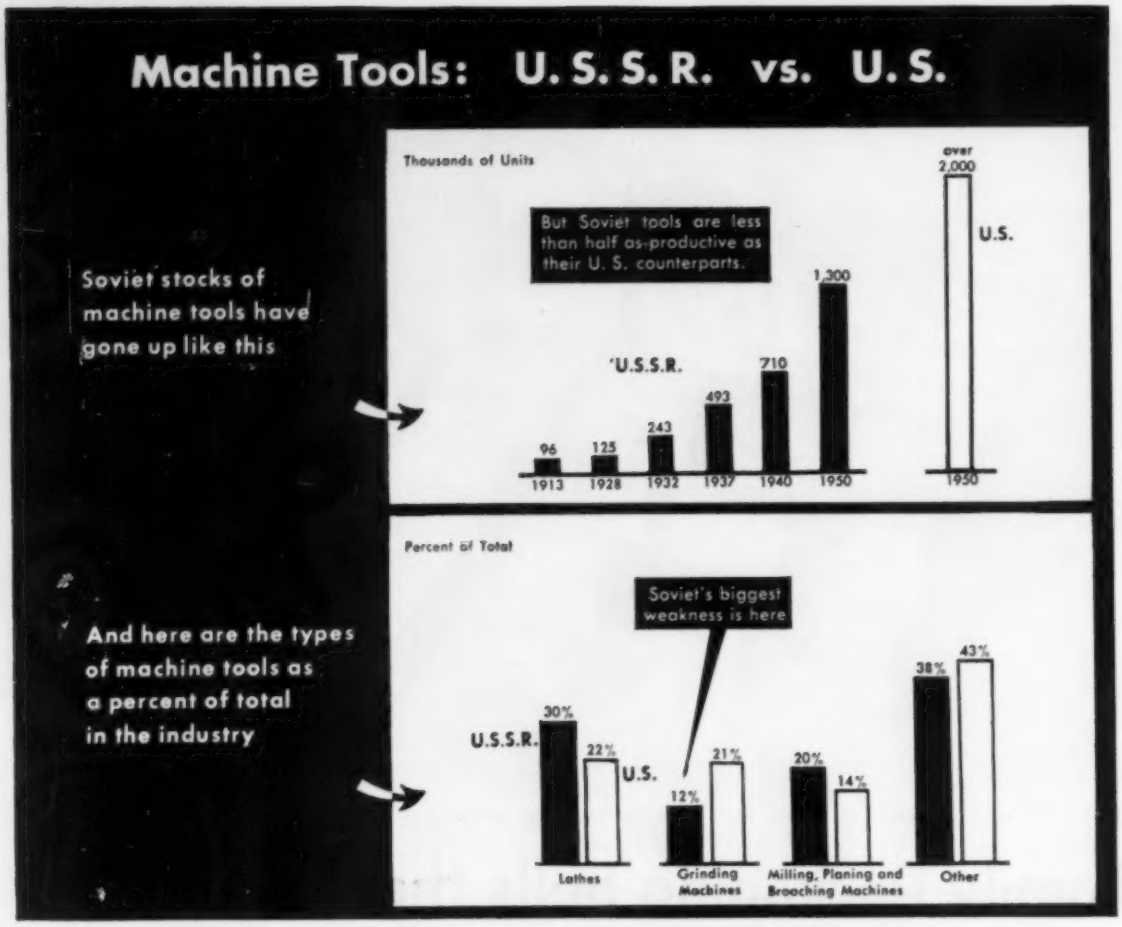
An industrial-design group was called in to create a new trademark. It came up with the word "Airtex" in sans-serif type, with the "A" both above and below the other letters. A ring of small spheres representing ball bearings circles the first three letters.

Color combination of the new Airtex packages is orange and blue. Company and part name appear on both end flaps of the package. Additional printing on the front flap includes the trademark, in reduced size, and a white unprinted panel for imprinting a part identification number.

The new design is marked by simplicity. No extra details clutter the package. Identification is immediate and accurate. The buyer knows at a glance exactly what he is getting.

On the Master Parts line, identity has been obtained through a combination of a dark blue background with two or more narrow yellow stripes encircling the packages, setting off a large initial letter "M" and the word "Master" as the focal point of visual interest. The number of stripes depends on the size and proportions of the individual packages, but width of stripes never varies.

All the new packages carry the general term, "Master Service Parts," with specific parts description imprinted separately on the end flap or side panel. Through this change, Master Parts has been able to consolidate box sizes, simplify package inventory, and save thousands of dollars, as well as enhance the display impact of the line. Shipping labels, letterheads, and envelopes also carry the new design.



This Is the Competitive Picture . . .

Digested from *AMERICAN MACHINIST*, April 11, p 118

Figures on Soviet equipment are necessarily estimates; they are based on data from Soviet publications. They are not precise. But experts feel they are accurate enough for broad comparisons with U. S. figures.

Russian and U. S. machine-tool stocks differ not only in size, but also in types. Russia has relatively few grinding machines—and this is its greatest weakness compared to the U. S. By contrast, lathes play a much bigger part in Russia.

In the early 1950s, grinding machines made up only 12% of Russia's total machine-tool stock, against 21% in the U. S. Some 30% of Russia's machine tools were lathes, against 22% in the U. S.

Soviet leaders—quite logically—have tended to put their newest, most productive machines in mass-production industries.

Another big weakness in Russia's metalworking plants is a lack of metal-forming equipment. Soviet experts admit that the more forming equipment a metals technology has (as against cutting equipment), the more economically it can use both metal and labor.

In 1953, forging and pressing machines numbered 17% of all U. S. machine tools. The Russian figure in 1948 was only 12%, and there's no indication that it has increased much since then.

Moreover, Russia's metal-forming toolbox is overcrowded with hammers, even though Russian engineers feel that presses are more productive than hammers. The U. S. decidedly prefers presses; only 4% of American forging and pressing units in 1953 were hammers. The proportion in Russia is at least 40%.

How productive is the average Russian machine tool? That is a tricky question. It's impossible to get a precise answer. But you can get an idea by dividing Soviet crude steel production by the number of machine tools in existence. This will give the amount of steel handled by the average machine.

The answer: in 1950, 19.5 tons per year. This compares with the U. S. figure, in 1953, of 43.9 tons.

MaK

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STORAGE BATTERY RAILCARS
RAILWAY COACHES
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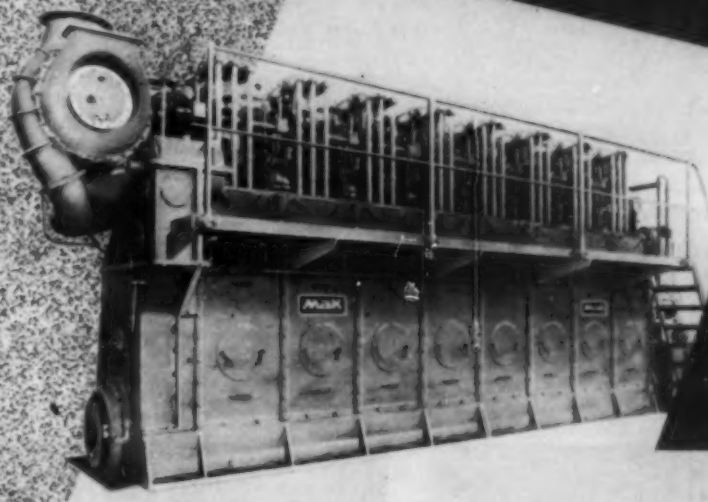

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MARINE AUXILIARIES
DIESEL PUMPING SETS
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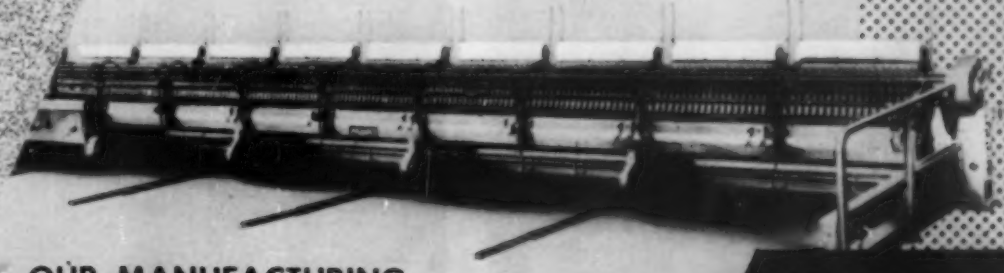
DIESEL GENERATOR SETS



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PROGRAMME

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KIEL-FRIEDRICHSORT, GERMANY

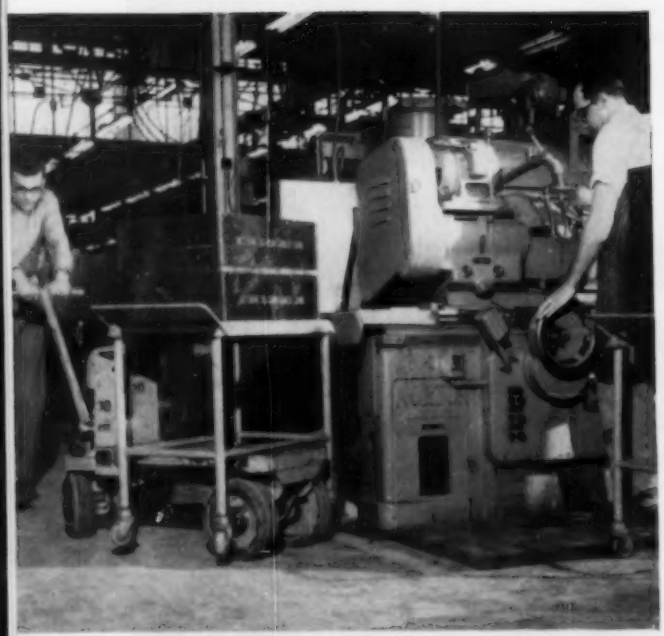
Digested from *FACTORY MANAGEMENT AND MAINTENANCE*, July, p95

Six Handling Ideas fo

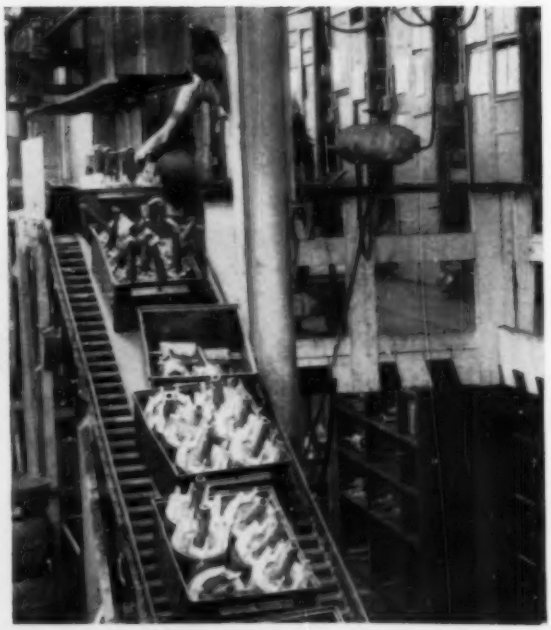
Do You Sometimes Wish You Had A Magic Carpet Or Maybe A Rolling Floor Like This . . .

. . . To Make Your Materials Handling An Easy Job? Here Are . . .

IDEA: MOTORIZED CONVEYOR is attached to electric oven. Thus Peer-



IDEA: DOLLIES on rollers handle parts boxes at Avco (Lycoming). Dollies elevate boxes to 30-inch working level, can be pushed on rollers or moved by truck.



IDEA: BELT CONVEYOR delivers materials to and from a storage balcony at U. S. Electrical Motors. The conveyor replaced an elevator that was a bad bottleneck.

less Aluminum Foundry has improved its core-baking process. Job is handled by one man instead of three.

IDEA: COLOR CODES—in small vivid squares—mark parts boxes. It means quicker handling by truckers on assembly floor at Dictaphone Corp.

s for Speed and Economy

IDEA: HUGE CHUTE is really three separate chutes leading to the same outlet. Three-way chute is used by McKesson & Robbins to handle many package sizes fast.

IDEA: MAGNETS handle finished parts in Producto Machine Co.'s machine shop. Advantages are speed and less damage. Magnets are battery-powered.

Here's how to Combine Simplicity and Economy in

Waste Treatment

Simplicity and relative economy sum up this unusual waste treatment installation for a large Southern paper mill. Primarily installed for suspended solids removal from general mill effluent, it is also doing a good job of B.O.D. reduction. The 300′ dia. Dorr Clarifier installed in an economical 500′ earthen basin removes approximately 90% of suspended solids . . . with a B.O.D. reduction of approximately 33%.

This Dorr Clarifier-earthen basin team is suited principally for use as a primary treatment unit. Additional treatment steps can be added as needed, without affecting the initial Clarifier installation.

If you have problems involving any phase of the separation of finely divided solids in suspension . . . or ion-exchange . . . or fluidizing techniques — chances are that Dorr-Oliver and its world-wide organization can help you.

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Automation in . . .

. . . Europe has been modified to meet special problems, to adapt to lower output than U.S.

Digested from *METALWORKING PRODUCTION*, June 10, p1035 and 1062

Each country has had its own problems. So it has been necessary to take the fundamental principles of automation and, in effect, rearrange them to their own needs. This means ingenuity equal to, if not as spectacular, as in the U.S.

• **Britain**—Automation pioneers in Britain have been Ford and Vauxhall, both in the automobile field. Ford makes two engine blocks on the same line by providing means of changeover by minor alterations only; line changeover time runs 20 to 25 minutes.

Another method to adapt the transfer principle to British production needs is by use of standard units. Austin, aided by James Archdale & Co., Ltd., carried on this development. Units, consisting of bases, beds, ends, panels, etc., are made in a few sizes to suit a range of work.

• **France** — Renault (automobiles) pioneered in France for two good reasons: lack of foreign exchange and the inability of the French machine-tool industry to do the job. Between 1946 and '54, Renault designed and built more than 600 special machines, including 3,000 automatic heads. It made good use of standard elements in multiple-head machines and of the platen principle in transfer equipment.

• **Italy**—Olivetti (business machines) proved that transfer machines and other automatic equipment can be applied profitably to small parts, even in limited production. The company has found that the indexing-table type of machine is more economical and simpler than transfer machines.

• **Germany**—The Germans have rapidly built a reputation for the type of machine expected in an era of automation. An example is the Burkhardt & Weber transfer machine for cylinder blocks, which inspects automatically, even removes chips from blind holes.

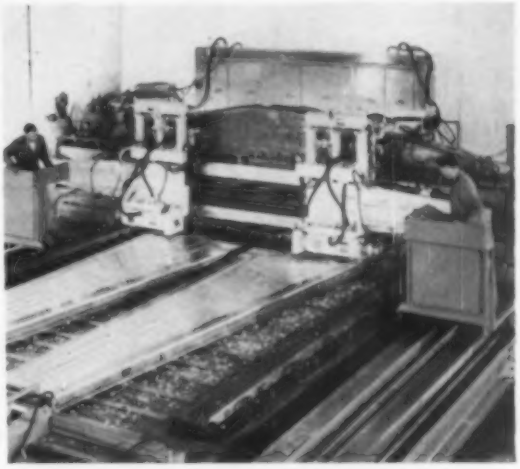
▶ HOW TO . . .

. . . build the new from the old

A 13-year-old pit planer was reborn—into this 450,000-pound, 30-foot-long skin mill. The conversion job, one of the biggest in machine-tool history, was done by Simmons Machine Tool Corp. for North American Aviation.

The skin mill machines one-piece aluminum-alloy wings for the Super-Sabre Jet fighter—two at a time. In only 3¼ hours, it does what formerly took 60 hours. Operators ride in pulpits mounted on traveling rails. Each has consoles with banks of pushbuttons hooked in with the machine's 60 individual controls.

Digested from *AMERICAN MACHINIST*, July 4, p150



. . . heat or cool corrosives

Not many materials can handle corrosive liquids—especially hot liquids. Glass can. Corning Glass Works has developed an all Pyrex glass heat exchanger that defies corrosion. Unit is of the shell-and-tube design with about 50 square feet of active area.

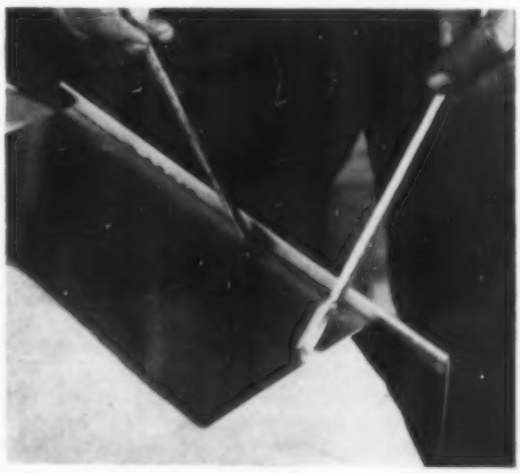
Corrosion resistance minimizes replacement-parts needs and permits rapid changeover from one product to another. For many applications, the exchanger may be cleaned in place with dilute hydrochloric acid. The unit is completely flexible. Any combination of series or parallel flow can be quickly set up.

Digested from *FOOD ENGINEERING*, July, p113

. . . solder stainless steel

Stainless steel is too smooth for good adhesion, so roughen it with abrasive cloth. Then follow these steps: (1) Apply flux carefully to surfaces to be joined. Surface smoothness may cause flux to collect in drops. To overcome, add one teaspoonful glycerine to one cup of stainless soldering flux. (2) Tack the two pieces with iron and solder. This secures pieces in position and controls buckling and warping. (3) Solder with a large iron, heated just above the melting point of the solder. (4) Scrape away excess solder with slightly softer stainless-steel tool. (5) Neutralize the pieces immediately after soldering by washing with sodium carbonate (5 to 10% solution), using a soft rag. Never let flux remain on material. Rinse and dry.

Digested from *POWER*, July, p140



RESINS added to cotton goods keep wrinkles out, put cottons into . . .

"Wash-and-Wear" War

Digested from *CHEMICAL WEEK*, June 25, p86

Clothes buyers, happy for the past few years over the new fabrics, are due for more of the same. Cotton-fabric men, needled by claims for synthetic fibers ("need little or no ironing"), now feel they can say that too. They feel they can now put the "wash-and-wear" tag on their new product.

It may not be a technological revolution. But it may well become a marketing revolution. Housewives, with all their automatic equipment, have never been able to iron clothes by just setting a dial. So they'll welcome the cotton that needs no ironing.

Already, nearly 50 "need-little-or-no-ironing" brands are sprinkled throughout store racks and on store counters. Some principal ones: Wrinkle-Shed (Dan River Mills, Inc., New York); Dry-Nu (M. Lowenstein & Sons, Inc., New York); Minicare (Joseph Bancroft & Sons Co., Wilmington, Del.); Valette (Robertson Bleachery & Dye Works, New Milford, Conn.); Dip-n-Dry (Fuller Fabrics Corp., New York); Dri-Smooth (Cranston Print Works, Providence, R. I.).

What lies behind these brand-name goods, their better looks, the ease in caring for them? The answer: urea-formaldehyde, melamine and "reactant" resins—and the extensive research that large chemical companies have put into their proper use.

The companies and their resins include American Cyanamid with its Aerotex series of resins, Du Pont with its Ze-set S, Monsanto with Resloom E-50, and Rohm & Haas with Rhonite-R-1. Many other firms sell similar resins.

Which type of resin is best is a matter of dispute. American Cyanamid, pushing melamine, claims that urea-formaldehyde and reactant resins (modified urea resins) react more permanently with chlorine; this weakens the fibers. Reactant resins also cost more than melamine.

Makers of urea-formaldehyde and reactant resins, however, counter with these advantages for their products:

- Lower cost for the desired degree of crease resistance.
- Less reactive to chlorine.
- Better processing with certain special finishes, such as Bancroft's Everglaze shreiner finish.

Despite the dispute, this can be said: All the resins (1) leave a highly wrinkle-resistant cotton, with a smooth, soft hand; (2) add no more weight to the fabric than does starching; (3) leave a good bit of cotton's natural porosity.

An added water-repellent improves tear strength, solubility, hand, drying speed, and ease of ironing.

But resin makers are concerned over the glowing claims of the garment makers. Many in the business remember the troubles that some of the synthetic fabrics had because they did not live up to the "wash-and-wear" notices. So they are worried that the new cottons may be "over-sold" and disappoint the public.

Resin makers, for example, do not claim a dogmatic "no ironing." Rather they claim improvement in the cotton's recovery rate. They know that the real test is this: wear the garment, wash it, look at it. Then decide if it needs ironing.

The future: Cotton producers in the U. S. have watched the synthetic share of the textile market climb from 8½% before the war (when cotton had 78%) to 25% (while cotton dropped to 67%). Now they are counting on the new cottons to lure back their lost business.

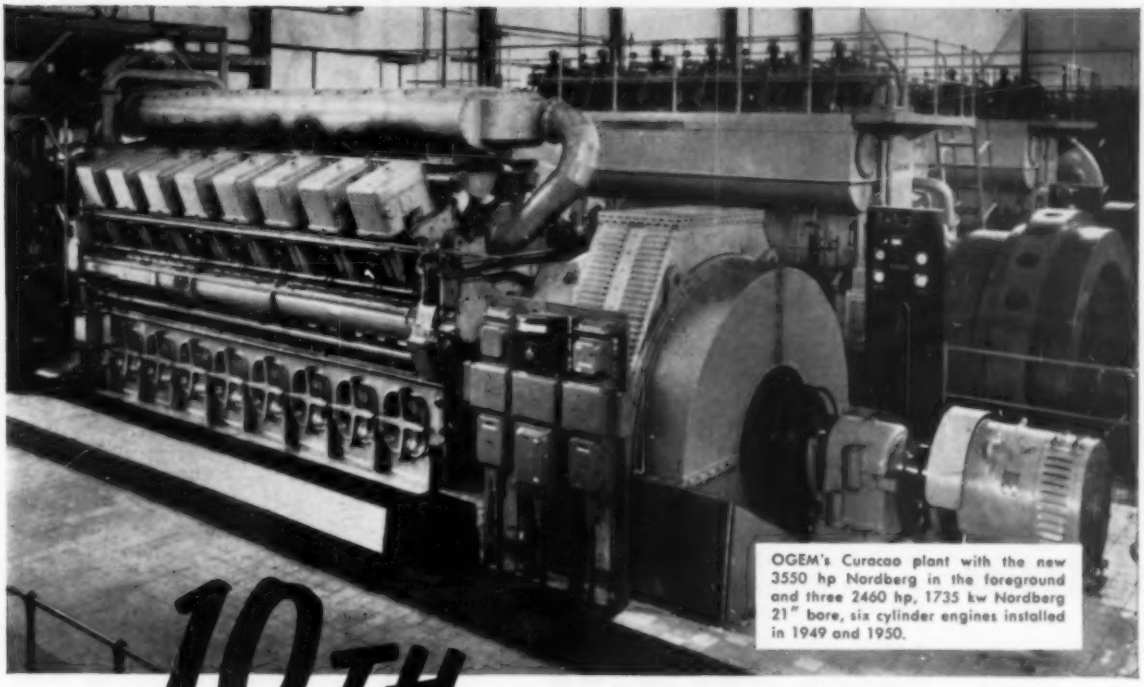
▶ NEW

Digested from *AMERICAN MACHINIST*, June 20, p121

Startling increases in tool life and cutting speeds come from diamond lapping of carbide boring and turning tools at Douglas Aircraft Co. Diamond-lapped tools produce more parts with better finishes and closer tolerances. The cutting edges have an extremely fine finish.

On one part, tool life per grind jumped from 34 pieces to 152 pieces. The part was 1½-inch chromium-molybdenum hexagonal steel stock. Length of cut was 5¼ inches at a 0.093-inch depth of cut.

The unlapped tool averaged 34 pieces per grind while operating at a speed of 352 revolutions per minute and a feed of 0.0007 inch per revolution. The lapped tool not only averages 152 pieces per grind but also allows increased speed and feed—740 revolutions per minute and 0.018 per revolution.



OGEM's Curacao plant with the new 3550 hp Nordberg in the foreground and three 2460 hp, 1735 kw Nordberg 21" bore, six cylinder engines installed in 1949 and 1950.

10TH NORDBERG DIESEL for Netherlands West Indies Power System

Here's evidence again of the reliability of Nordberg Diesels as N. V. Overzeese Gas En Electricitiet Mattschappij of Curacao, Netherlands West Indies places their tenth Nordberg engine in operation . . . a 16 cylinder V-Type *Supairthermal*® Diesel engine rated 3550 hp, 2500 kw at 500 rpm. Installed at Curacao, the new engine gives this plant a total of 10,930 Nordberg horsepower. Four Nordberg Supairthermal engines are also providing 5640 hp at this progressive utility company's Aruba Island plant and two 2670 hp V-type engines were recently placed in service at the Paramaribo station. *A total of 21,910 Nordberg horsepower!*

When additional power was needed, Nordberg users like N. V. Overzeese Gas En Electricitiet Mattschappij, *naturally chose Nordberg again*. They have had *proof* of Nordberg's reliability and low operating and maintenance cost. *It's what they expect of Nordberg Engines!*

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Petroleum's Future

Digested from *PETROLEUM WEEK*, Pilot Issue

A. L. Lyman, executive vice-president of California Research Corp., says the petroleum industry can expect big things in the years ahead. Speaking before a meeting of oil refining experts, Lyman painted this picture:

Demand for most kinds of petroleum products will go up fast during the next 10 years in the U. S. Some older products, such as kerosine, will probably not gain much. But the U. S. will use new, improved products more and more.

The U. S. itself, as Lyman sees it, will not be able to supply all this petroleum. The huge demand can only be met by adding imports to U. S. production. This will mean big sales for oil producers outside the U. S.

Many of the changes Lyman foresees in U. S. use of petroleum will probably also take place in other countries. Here are the changes he expects, product by product:

Gasoline: Development of the gas turbine engine for automobiles will push ahead in the next 10 years. By 1965, this engine may have reached quantity production. When that happens, refiners will probably have to make some big changes in the kinds of gasoline they turn out. Until then, at least in the U. S., the demand will be for gasoline with very high octanes. There will also be a good deal of research and development work on gasoline additives — chemicals added to the fuel for such purposes as preventing engine rust, cutting down the amount of tar-like deposits, and preventing ice formation in carburetors.

Diesel Fuel: Railroads' demand for this fuel is expected to go up —slowly in the U. S., where most of the locomotives are diesel engines now; probably faster in countries that still have mostly steam engines. In the U. S., diesel fuel may suffer a little as railroads find efficient ways to use the cheaper residual fuels.

Residual fuel is, essentially, the

material left over when all other fuels are refined out of crude petroleum. The trouble with it is that (1) there are not many buyers for it; yet (2) refiners keep turning it out, for it is a by-product of popular fuels such as gasoline. It's likely that in the next 10 years, as in the past, refiners will find new techniques that get more popular fuels out of crude oil, leave less residual oil.

Lubricating Oil and Grease: These products are always sure of a place in any nation that uses machines. But it seems likely that in the next 10 years the demand for them will increase only moderately in the U. S. This is because of better designs in all kinds of machines.

Asphalt: An ambitious highway-building program in the U. S. over the next 10 years will mean a big increase in the need for asphalt. Probably the kinds of asphalt needed will change as research finds ways to improve it.

Petrochemicals: This large and growing group of products made from petroleum will have a growing demand in the coming decade. All kinds of things can be made out of petroleum, from plastics to perfume. The volume of petrochemicals is small compared to that of all petroleum products; but it can be a profitable volume for refiners, who supply the special parts of crude oil from which petrochemicals are made.

➤ NEW

Digested from *PAPER INDUSTRY*, June, p244

The first commercial chemi-groundwood newsprint mill is now in operation at Great Northern Paper Co. (East Millinocket, Maine). Scientists at New York State College of Forestry developed the process.

The digester plant, with two digesters, can treat a minimum of 150 tons of hard woods per day. After logs cook at a pressure of 150 pounds per square inch and a temperature of 310°F., they are ground in 67x54-inch grinders. The chemi-groundwood then passes on to the usual subsequent processes — screening, blending, and finally to the paper machine.

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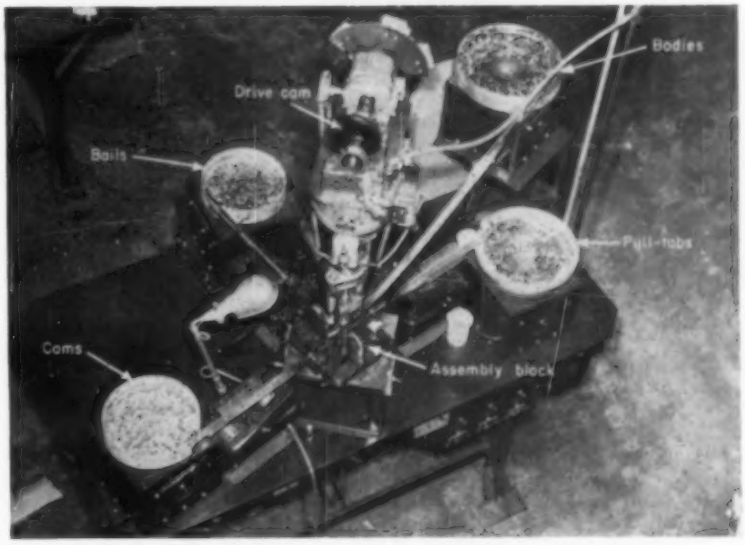

Digested from *AMERICAN MACHINIST*, July 4, p132

Automatic Assembly—Simple and Fast

Simmons Fastener Corp. had to reduce production costs on its Relees-It slide fastener. Automatic assembly does it at a rate of 100 units per minute by combining four parts, fed from surrounding bowls. The machine is built around a drillpress head. It positions the cam and pull-tab in the assembly block, feeds in the bail, and by a drive cam presses the body into position and spins over the bail. Precision switches control the machine. The result: a price competitive with non-release slide fasteners.

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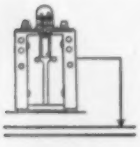

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Gas Flow Control

System saves money for Japanese utility company at rate of $8 for every $1 invested

Digested from *CONTROL ENGINEERING*, July, p95

An investment of $100,000 in automatic controls saved Tokyo Gas Co. $800,000 in expansion costs. The company supplies 4-million cubic meters of gas each day to Japan's largest metropolitan area. Here's how Tokyo Gas saved expansion.

The heating value of the output gas has to be 3,600 kilocalories per cubic meter. Low-calorie producer gas and air dilute high-calorie oil and coal gases to make up the output gas. Formerly the gas was hand-mixed and the product stored in gas holders until needed.

With automatic control, the high-calorie gas can be diluted just before distribution. This means that the existing tanks for storing 3,600-kilocalorie gas can now store the 9,000-kilocalorie high-calorie gas. Thus the company in effect gets an increase in storage capacity of about 2½ times.

Tokyo Gas had been facing the necessity of buying new gas holders because of rising demand for gas. But storing the high-calorie gas was the same as getting 120,000 cubic meters of extra holding capacity. New holders would have cost $800,000.

A Junkers calorimeter is the heart of the system. It measures the caloric content of the gas as the gas moves from the system to customers. Feedback from the calorimeter operates various mixing valves and ratio controllers. The heating value of the output gas varies no more than 0.7% with the automatic setup compared to 3% with manual control.

The Junkers is a water-flow calorimeter; hence, it is sluggish. It has a time constant of 2 minutes, a dead time of 3 minutes. It is inexpensive and reliable.

The lag in the calorimeter is balanced by the small holder for 3,600 kilocalorie gas. This filters the shock of a demand change before it affects heat content of the gas.

▶ MARKETING

The Scientific Store Site . . . A Computer Finds It

Digested from *BUSINESS WEEK*, May 14, p68

Rayco Manufacturing Co., maker of automobile seat covers, does not believe in doing business by guess. When Rayco decided to open some retail stores in the San Francisco California area, it figured out how and where by using an electronic computer.

The San Francisco area was completely new to Rayco. The company had no stores there at all. There was much to be gained in moving into this new territory, but there was also much to be lost if the campaign were poorly planned. So Rayco worked out its San Francisco move as meticulously as a military maneuver.

Rayco needed to know two things above all: (1) How many stores should it set up in the area? The company wanted enough to cover the whole market, but not so many that the stores would become each other's competitors. (2) Exactly where should it put them?

Here is how Rayco found its answers.

The company's research department, headed by a master statistician named Eli Goldberg, took these questions one at a time. The first problem was to find out how many stores the area could support. The logical way to do this, it seemed, was to figure out how many potential seat-cover sales the area represented—in other words, how many seat covers would have been bought in a year if there had been Rayco stores in the area.

To solve this complex problem, Goldberg and his staff listed all the factors they could think of that might have an effect on sales, such as the area's population, the incomes of its families, the number of cars. In the end, Goldberg collected 300.

He and his men then gathered data on these 300 factors in 51 cities where Rayco already had stores. Putting these data alongside the stores' sales, and studying the apparent relationships between the factors and the sales, Goldberg found that a good many of the factors had little or no effect on sales.

He eliminated all but 74.

It was now time for the electronic calculating machine to take over. Rayco gave all its data to International Business Machines Corp., which maintains an electronic computing center in New York City. The data were fed into a monster computer called the "701."

The computer faced a task that would have been almost impossible to do by human hand and brain. It had to calculate the effect on sales of each factor—not considered alone, but considered with all of the 73 other factors working at the same time.

The machine, seeing things that Goldberg and his staff could not see, enabled Rayco to drop some more factors as unimportant. Only 37 factors were left. These were the really important ones; each of them worked powerfully either for or against possible sales of seat covers.

Then, with the computer's help, Rayco worked the 37 factors into a mathematical equation. It gave a solution in sales per square mile per year. Checked against cities where Rayco stores were already operating, the equation proved to be remarkably accurate.

Rayco then applied the 37 factors to the San Francisco area and figured out the area's probable yearly sales potential. With this figure, it was comparatively easy to work out the number of Rayco stores the area should have. The number was six.

Next question: Where should they be?

Goldberg and his men picked nine important factors. They fed these into IBM's machine. The machine ranked them in importance like this: Number of families, number of automotive outlets, buying income per person, bank deposits, ratio of families to total population, total retail sales, percentage of foreign-born whites in the population, apparel store sales per family, and population change from 1952 to 1954.

Next, each of the San Francisco area's 249 census districts and 35 small cities were analyzed on the basis of these nine factors. Out of this, eventually, grew a "cluster" map—a map covered with dots, each dot representing one potential seat-cover sale. This map let Rayco figure out exactly where each of its six stores should stand so as to be close to the greatest number of customers.

Rayco has thoroughly tested this whole statistical process by applying it to existing stores. The results convince Goldberg that he is on the right track.

Take Rayco's Syracuse store, for instance. It is the only Rayco store in the city. Its site was picked years ago, by traditional methods. Goldberg's statistical process points out a site almost exactly where the store now stands. Significantly, the Syracuse store is one of Rayco's best.

▶ NEW

Digested from *CHEMICAL ENGINEERING*, July, p140

Acrylic paint, many paint experts believe, may soon woo consumers from rubber latex paint. A major drawback is its higher price. Despite its water solubility, fast drying, washability, and ease of application, it will need active merchandising. So far, Montgomery Ward is the only large maker and promoter.

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Canned Wine Is Here! Test Sales Successful

Digested from *SALES MANAGEMENT*, July 1, p49

You can put soup in cans—and lighter fluid, and putty, and lemon juice, and shaving soap. But NOT wine! This rule has been followed faithfully for years by everyone connected with the industry—until this year, that is.

Yosemite Winery (Madera, Calif.) took the step that defied all those who said that wine must be bottled. Yosemite decided to take wine out of the specialty class and put it into the housewife's supermarket basket, just like premium beer. This could be accomplished with a popular and cheap package—a can.

During the past few months, Yosemite has been proving its point with Carina-Kan-O-Wine, sold throughout northern California on a test basis. Successful test sales have included sherry, port, muscatel, white port, tokay.

Carina-Kan-O-Wine is put up in 12-ounce cans — wax-lined, cone-topped, and crown-capped. Wax lining is needed for preservation. Cone-topped cans are used because they can be wax-lined (flat tops cannot) and can be recapped easily at home.

▶ NEW

Digested from *INDUSTRIAL DISTRIBUTION*, July, p86

Sales territories can be controlled very easily by the small businessman. Five basic control principles have recently been outlined by one expert to provide such control:

(1) Keep territory size practical. Do not let the salesman cover too big an area or contact too many clients. (2) Plan routes that are practical from the viewpoint of transportation. (3) Outline each territory carefully, using some kind of natural or political boundary. Do not let salesmen go beyond bounds. (4) Do not let salesmen conflict by criss-crossing wholesale and retail calls. (5) Plan equal territories, so that all men have about the same sales opportunity.

MARITIME

Whose Are the High Seas?

Digested from *THE ECONOMIST* (London), Apr 23, p267

The nations of the world have agreed for centuries that, in times of peace, the world's oceans belong to everybody. But in the past few years, there has been a tendency to argue with this tradition. One nation after another has marked off sea areas and called them its own.

Three South American nations, for instance — Chile, Peru, and Ecuador—now claim a 200-mile-wide belt of ocean that stretches almost all the way down South America's Pacific cost. In the Antarctic regions, big pieces of sea are subjects of who-owns-what arguments. The Philippine Islands have defined their territorial waters so as to take in vast reaches of ocean. South Korea has drawn a "Rhee line" many miles from its coast, and has used armed force against Japanese fishermen who have gone over the boundary.

In recent years, Scandinavian fishermen have bumped against the painful fact that Russia claims 12 miles of sea off its coast. Norway and Iceland have kept foreign vessels out of certain coastal waters well stocked with fish.

All this worries many thoughtful observers around the world. They admit that the trend has not had any really bad results as yet. And they admit that some of the nations' ocean claims are modest.

Nevertheless, as the worried observers see it, the trend could lead to real trouble. Boundary disputes could flare up; trade and commerce could be hurt; the result would undoubtedly be new international friction. Some observers are not worried so much by these possible results, but by what they feel is a violation of principles. The freedom of the seas is something sacred, they feel, and to draw boundary lines on the oceans is wrong in itself.

What can be done about it? Some feel that an international conference would settle the matter. Others think the United Nations might take on the task.

Still others think the best solution is to tackle the problem sea areas one by one, through conferences between the nations interested in each area or perhaps through international arbitration.

Digested from *MARINE ENGINEERING*, June, p38

Big Payload, Modest Size

Improved design permitted the builders to cut the length of the self-unloader Detroit Edison, yet leave its coal-carrying capacity virtually unchanged. Six inches added to the hull's depth over previous designs and a 3-foot high step in the spar deck provided the extra capacity. The step also improves the vessel's seaworthiness. The ship sails the Great Lakes.

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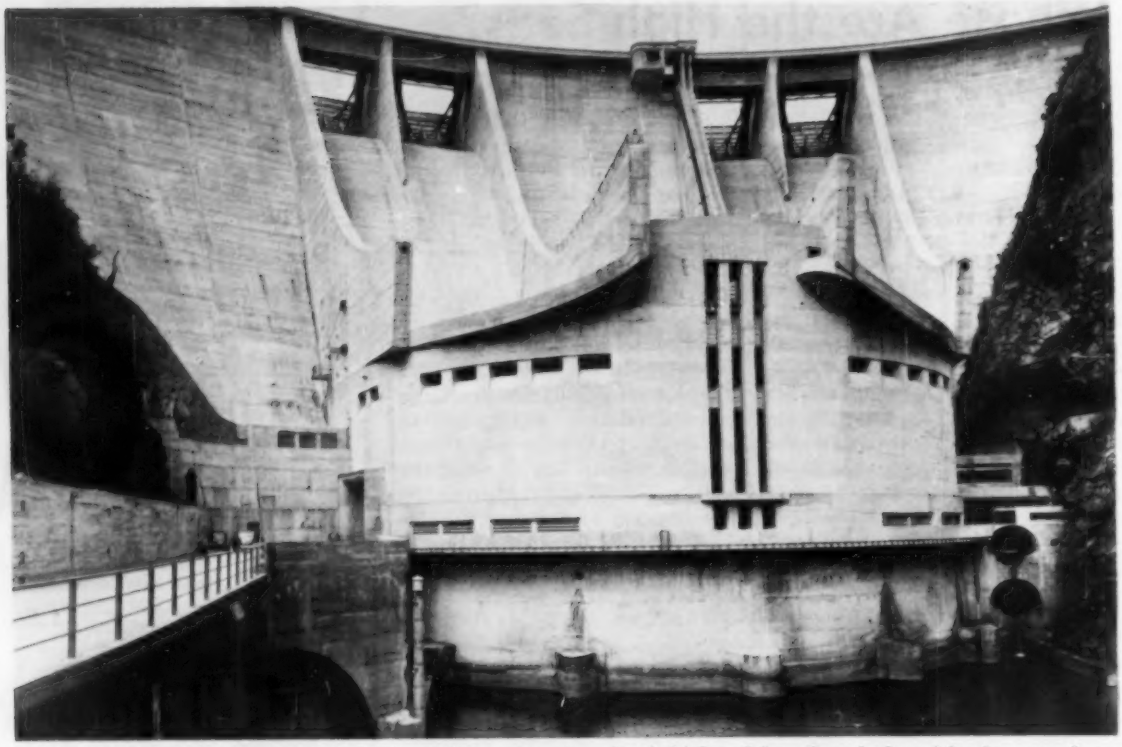

SKI-JUMP SPILLWAYS twist sheet of spilling water, throwing it high and far off roof of semicircular powerhouse.

Digested from *ENGINEERING NEWS-RECORD*, June 30, p34

French Hydro Thrives on

The French hydroelectric program continues to add projects that arouse interest and admiration. Since the war, France has practically doubled its hydroelectric capacity in an intensive program to reduce dependence on imported coal.

Now, with a better hydro-steam balance established, emphasis has shifted to steam and boilers fired by slimes and coal washings brought from mines by pipeline.

But despite this shift in emphasis, French hydro projects continue to display the exciting French touch. France has:

- Virtually completed development of the Dordogne River, with four dams featuring ski-jump spillways.
- Produced, at two dams, 3.6-billion kilowatt-hours of a potential 14-billion kilowatt-hours in its greatest source, the Rhone, and has another 1.67-billion kilowatt-hours on the way with another dam.
- Completed on the Upper Rhine one station with a 906,000-kilowatt-hour yearly production; and put under construction another to produce 960,000 kilowatt-hours.
- Completed at Tigues the highest concrete dam in Europe.
- Set a new world record in the Pyrenees for power capacity in the high head class—two 109,000-horsepower turbines operating under a 3,687-foot head.
- Started development of the Durance River in the southeast part of the country. Here, France is undertaking its first earth-fill dam.

Outstanding features of the entire French hydro complex are a thin arch dam, an overhanging arch dam, and ski-jump spillways.

Damming the Gage River for the Montpezat project offered a favorable opportunity for a daring concrete arch. As designed and built, Gage Dam is the thinnest concrete arch dam ever built. It is 125 feet high and 472 feet long at the crest. It is 4.3 feet thick at the top and 7.88 feet thick about 8 feet above the base. At the very base its thickness is 12.5 feet. The dam contains a total of 6,500 cubic yards of concrete.

These unusual proportions for a concrete arch result from use in the design of average stresses of 1,422 pounds per square inch, more than twice that yet used in a dam of this type. Some steel reinforcing was added to the most highly stressed portions. Observed deformations to date have been no greater than expected and stresses have been below those calculated during the design stage.

At Corresque on the Trujere

THINNEST DAM is 7.88 feet thick.

ARCH DAM leans downstream.

Bold Design

River, the French have built a dam with an arch that, instead of being vertical, is inclined downstream. Its shape results from piling on top of one another arch sections with a central angle of about 120 degrees. Downstream inclination of the dam's axis assures stability.

Corresque Dam is 215 feet high, and its crest length is 575 feet, all available as a spillway. The crest has dividing projections to prevent development of vacuum effect between the face of the dam and any solid overflowing sheet of water.

Discharging spillways at L'Aigle Dam on the Dordogne River consist of twin troughs, curved and superelevated in such a manner as to rotate the flowing flat sheets of water to a vertical position so they will be confined within the walls of the gorge below.

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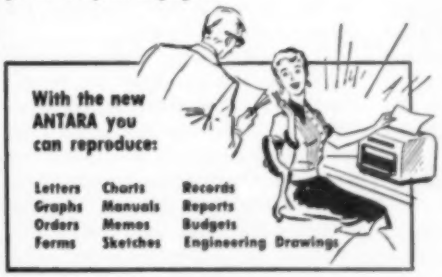

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Construction Booms

In Latin America, nearly all types show increase over last year. No letdown is in sight

Digested from *CONSTRUCCION*, Mar, p44

This year's building activity in Latin America is at an all-time high. A survey of all projects valued over $1-million shows that more than $8-billion worth of construction is either underway or planned. This is an increase of almost $1-billion—about 13%—over 1954 construction costs.

This survey, made yearly by the *Construccion*, has come up with steadily increasing figures for five successive years. In the 1955 survey, almost every section of the Latin American construction industry showed a gain over 1954. Out of 17 classifications, only two slumped. These were electric power and oil construction. Thirteen sections climbed. Among the biggest gainers were reservoirs, with an increase of 96% over 1954; railroads, with a 66% increase; and sewers, with 56%.

The drop in power and oil construction is not regarded as the start of a long downward trend. Long-term plans for power and oil development in Latin America are gigantic. One of the factors behind Latin America's construction boom is the building of local plants by U. S. companies.

The boom is actually much bigger than *Construccion's* survey makes it look. Minor projects that spring up as a result of major ones are not tabulated. Often the total of these minor projects is bigger than the original major project that fathered them. When city streets are built, for instance, this measurable investment is often a prelude to construction of private dwellings, stores, office buildings. *Construccion's* survey does not list this activity. But totaled it may represent a bigger investment than the city streets themselves.

All this adds up to a big market not only for Latin American construction companies, but for manufacturers of construction equipment throughout the world.

NEW ALL-PURPOSE WAGON can carry 25-yard heaped loads, as well as handle big rock. Movall's positive cable ejection pushes out the rock.

Unique Earthmoving Wagon

Digested from *CONSTRUCTION METHODS AND EQUIPMENT*, June, p152

C&D Manufacturing Co. (Perkins, Calif.) wanted to build a new type of hauling unit for contractors. But before it settled on the final design, it wisely surveyed the contracting field to learn what the contractors wanted in an "ideal" machine.

The result of the survey is a 25-cubic yard (heaped) 31-ton Movall all-purpose wagon that has a unique "scraper-in-reverse" positive unloading feature. The scraper-in-reverse idea is the real feature of this rig. Actually, all you have to do to understand the unloading principle in the Movall is just to picture a scraper turned around.

The Movall's cable-powered ejector shoves the load out to the rear instead of forward. It even uses the same two-line cable control as a scraper, thus eliminating modifications or attachments. It's a good feature, as it gives positive dumping action on mud and frozen or sticky materials. It permits the operator to spread materials on the fly in even lifts. He can dump in corners and into hoppers with exact quantity control.

Actually, the Movall will do everything the scraper does except self-load and grade its own or previously dumped loads. It will also do a couple of things the scraper cannot do—dump clear of its own wheels and can take the punishment of handling rock with big shovel loading.

The survey showed contractors wanted a rig that could be interchangeable in the field without expensive attachments and modifications. The Movall makes it comparatively easy to switch prime movers on the job. Standard yokes are available for the Caterpillar DW20 and DW21. Adapter yokes for other prime movers are available, and the change can be made by two mechanics in 4 to 8 hours.

Briefly, here are the construction details:

- Heavy-duty rock body is formed of high-tensile-steel plates. Double bottom is hardwood-filled.
- Ejector assembly consists of a heavily reinforced ejector "blade" that rides on the body's top rails.
- Cable system is simple, yet effective. To dump, the operator releases the backhaul drum, which allows the tailgate to drop, then engages the ejector line drum. As the ejector is pulled back to clear out the load, the backhaul line feeds out. After dumping, the operator releases the ejector drum and engages the back haul. The tailgate closes and the line retracts the ejector to its forward position.

The Fourth Month

In the last three months we have announced that six new publications have been added to our list of digested magazines. These were added, of course, so that the Management Digest could improve its service to you.

We now add two more publications — the McGraw-Hill American Letter and the new Petroleum Week. The American Letter is an internationally famous analysis and forecast of America and world business activity. It keeps world businessmen informed on general business, trade, and finance. Petroleum Week is a brand new McGraw-Hill magazine dedicated to the interchange of ideas throughout the oil and gas industry.

➤ NEW

Digested from *ENGINEERING NEWS-RECORD*, July 14, p33

They build cities on speculation in Florida. It's done elsewhere, too —Levittown, Pa., for one. But in Florida there are special conditions. High ground-water makes septic tanks inoperative. And water is at a premium. So developers go all out in building municipal facilities in order to sell houses.

Originally, promoters of Carol City, a Miami suburb, figured on selling 10,000 houses at cost. Their profit would come solely from the land they improved, the commercial centers to be built, and the utilities they would own and operate.

But various federal and local regulations have changed the plans somewhat. Houses are being sold at higher than cost. Sale price of the house includes the buyer's share of the utilities costs. He pays initially and only once. Carol City Utilities (the builders' organization) will own and operate the water and sewage works. And it can sell out at some future time only to a municipal entity that would not further assess the home owners for their utilities. Water rates and sewage charges are comparable to other communities.

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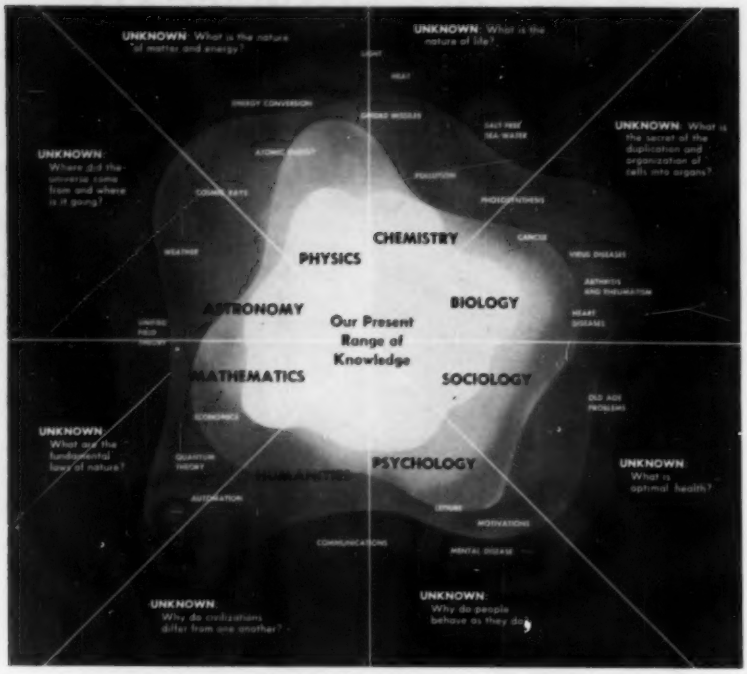
UNKNOWN: What is the nature of matter and energy?
UNKNOWN: What is the nature of life?
UNKNOWN: What is the secret of the duplication and organization of cells into organs?
UNKNOWN: Where did the universe come from and where is it going?
CHEMISTRY
PHYSICS
BIOLOGY
ASTRONOMY
Our Present Range of Knowledge
MATHEMATICS
SOCIOLOGY
PSYCHOLOGY
UNKNOWN: What are the fundamental laws of nature?
UNKNOWN: What is optimal health?
UNKNOWN: Why do civilizations differ from one another?
UNKNOWN: Why do people behave as they do?

THIS IS A PICTURE of the area in which research operates. Scientists start from the base of what is known—represented as the white area, center. They are working in an area of the partly known—the gray area in which they may have glimpses of knowledge or perhaps no more than a working hypothesis. Ahead of them is the unknown—a black area that contains most of the basic questions (such as what is the nature of matter or of life) toward which thinking men have been working for generations.

Digested from *BUSINESS WEEK*, May 28, p104

Science Looks at Tomorrow

You can find many a company today that will tell you its major products did not exist 15 years ago. And it's likely that 15 years from now companies will be built on products that do not exist today. Behind this constant change is research.

In the U. S., research work once was done almost only in colleges. But now its home is industry. Elsewhere, also, industry has picked up the major share of research.

Industry's management has clearly come to rely on research as a weapon. Without a steady stream of improved and new products, few big manufacturers could stay alive long in this competitive age. The researcher, for his part, cannot find the money and facilities for research anywhere but in industry.

In trying to figure out where research stands today, some scholars think it is the result of the industrial revolution. As they see it, research is taking us into a third phase of the revolution. Like this:

Phase 1 was invention. Man had been inventive from the beginning. But not until he collected much information and perfected his reasoning processes did he become "scientific." When inventors began to use scientific method in the 18th Century, the result was the industrial revolution.

Phase 2 was organization. It began in Germany toward the end of the 19th Century. German science helped industrial processes. This was the beginning of organized industrial research. Previously, science had moved forward by itself; it had not worked much for industry, though it had often come up with knowledge that industry could use. Now, science was working directly for industry. It was the kind of science called "applied" or "developmental." Of course, "pure" science—the long-range kind, seeking knowledge for its own sake—still moved forward by itself.

Phase 3 is innovation. In this phase, scholars think, pure science will emerge as the leader of industrial practice. This is the kind of science that today's researcher wants to work with. As many scholars see it, industry will eventually prove willing to pay for this kind of science on a big scale.

Phase 3 will lead to the brave new world that today's young scientist dreams of—a Utopia in which machines do all the work and man enjoys the best possible health.

This Utopia is not, of course, just around the corner. Man has gathered a lot of knowledge in the past 200 years. But there is probably no limit to the vast area of things still unknown to him. It will take time to reach the Utopia stage.

Look at the chart above. The outermost fringe of gray represents man's deepest penetration into the unknown. This fringe is the one where pure scientists work, constantly trying to push deeper into the black. The area inside this fringe, between the unknown and the fully known, is where applied scientists work. Applied science translates the findings of pure science into things that the layman

can see — refrigerators, plastics, television sets.

The applied-science circle cannot ever get larger than the outer fringe. That's why pure science, exploring basic unknowns, leads the way of all technology. No one can predict exactly where it will lead next, or which of its frontiers it will push forward the most quickly. But wherever it goes, applied science will follow; and the result will usually be better living for man.

Here are just a few of the frontiers where pure science is working:

Single field—In 1953, Dr. Albert Einstein published what is called his "unified field" theory. This theory says, in effect, that the gravitational field and the electromagnetic field around us are compatible—not two different things entirely, but parts of a single field. It took researchers 30 years to catch up with Einstein's theory of relativity, and it may take them equally long to catch up with the unified field theory.

When they do, however, it may help them find answers to all the basic questions of life, matter, energy. Many scientists feel that nature is really simple and that only man's ignorance has kept him from seeing the simple relationships among factors in his environment. Einstein's work may help uncover these relationships, opening the way for a vast new harvest of knowledge.

Matter—Einstein's previous theories led the way to work on the atom, to the A-bomb and the opening of the atomic age. But there are still many things physicists would like to know about the nature of matter. One problem they are working on now is that of what they call fundamental particles. Physicists have identified some 20 different forms of matter or energy. If theories can be developed to explain how they act—and why—science will have gone a long way toward understanding the nature of matter.

Energy—Tremendous progress has been made in the study of energy through the past 15 years. Scientists have been learning, for instance, how to develop and control atomic fission and fusion. There has also been some progress in getting useful energy from the sun.

All this excites practical researchers; for nuclear and solar energy, unlike other kinds, can be developed almost anywhere in the world. They do not depend on large sources of fuel such as coal or oil, or on big amounts of running water. The main drawback of nuclear and solar energy, at the moment, is that in order to turn them into useful electricity you have to use a heat link. In the case of atomic fission, for instance, you use the heat of the reaction to create steam in a boiler (see p18). The steam drives a turbine. This heat link wastes a huge amount of the original energy. Scientists are looking for a way to convert the energy directly into electricity. Some recent developments show promise.

These are some of the frontiers on which research is now working. Others are in the fields of medicine, sociology, chemistry, astronomy.

But somebody must support the research. As each year goes by, a bigger part of the bill goes to industry; and it seems likely that the trend will continue.

As most observers see it, the big question is not whether industry has the money to support this "pure" kind of research. Rather, the question is whether industry will be willing to spend the money.

It is a problem for each individual company. There are many successful companies in the world today that spend little or nothing on research. On the other hand, business history is full of companies that failed because they did not keep up with scientific developments. Each company has to decide its own need for research.

Once a company has decided that it needs research, it must be ready to back up its decision with no small amount of money. It must think in terms of a great amount of money spread over a period of many years. This is the kind of research that competitors are paying for; there is little gain in trying to get by with less.

Another problem is manpower. Research scientists are in short supply, just like engineers. As more and more of the world's nations develop industrially, the demand for scientific and technical workers climbs steadily. To get these men today, companies have to offer high salaries and good working conditions.

The shortage may not ease much in the next few years. Indeed, it seems likely that it will grow worse. This could put some companies in the position of having the money and the will to do research, but not the manpower.

Then there is the problem posed by the research scientist himself—his trouble in seeing management's view, and management's in seeing his. The research scientist seeks only one thing: knowledge. Management, on the other hand, wants something it can sell—and at a profit. What steps can a company take to bring the two ways of thinking together? This is a question that will keep many thinkers busy for many years.

Studies show that it is best to organize researchers around projects, according to their particular talents, rather than trying to fit them into an ordinary job structure. In other words, build the organization around the men rather than jam the men into a predesigned organization.

▶ NEW

Digested from *AVIATION WEEK*, July 4, p12

Hypersonic-flight problems — aerodynamic heating, stability, and control—are subjects of a major research effort by the U. S. National Advisory Committee for Aeronautics. So far, infra-red photographs of a model in a hot-gas stream show a rapid heat build-up on a sharp nose and on thin wing leading edges. Possible solutions: blunt configurations and "sweat" cooling.

Good dynamic stability may have to be sacrificed for good high speed and altitude performance. But automatic controls may counter this problem. Static instability because of vortex and shock-wave interference has been reported by the NACA. Design of shapes and positioning of control surfaces may be the deciding factor.

NACA researchers also reported that analog computers have successfully checked out proposed control systems prior to flight. Increased use of these computers is termed a "new technique."

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YOU AND YOUR PERSONAL AFFAIRS

Medical advances are lengthening your life span. Reports at the recent convention of the American Medical Association forecast that in a matter of years the common cold, tuberculosis, pneumonia, and syphilis will be only unpleasant memories; that new hearts, kidneys, and lungs may be provided by transplants; that life will be longer.

Other reports: Large-scale consumption of alcohol destroys brain cells that control the will power. Long-lasting headaches may come from straining the nervous system. Foot baths in shower rooms are useless in preventing athlete's foot, or ringworm. The fatty substance in the bloodstream, involved in hardening of the arteries, can be controlled by a new drug.

Also hard to believe but true is that surgery risk has been cut in half in the last 10 years. The credit goes to better diagnosis and techniques, new drugs, blood transfusions, getting patients out of bed earlier.

✦ ✦ ✦

Man's best days are not over at 60 years of age. The histories of 400 career men—notable writers, painters, soldiers, statesmen—show that 66% of all their great achievements were consummated after they had passed their 60th year. This is their record: 35% of those great achievements made between the ages of 60 and 70, 23% between 70 and 80, and 8% over 80.

✦ ✦ ✦

Seat belts for automobile riders, much like those used by the airlines, are going on the market. Chrysler says it will sell a seat belt as extra equipment with its cars. Judging by the signs, Chrysler's move is just the beginning.

How effective are auto seat belts? Up to 30 or 40 miles per hour, quite effective. They keep the passenger from being thrown out of the car or against glass and metal inside the car. But over that speed, a seat belt can lead to trouble. It tends to "jack-knife" the passenger—throw his head forward so that it hits the dashboard. Head injuries are serious: they can mean blindness or brain injury.

Auto designers know this. That is why you see more and more flat surfaces on and above the dashboards of newer cars. Studies show that the head can survive a serious blow if it hits a flat **that will dent.**

Chief value of seat belts, at present, is to protect children in **sudden stops.** Children are often seriously hurt in stops that merely shake up adults a little.

✦ ✦ ✦

Household tip: A good way to remove dents in a carpet caused by furniture legs is, first, to vacuum the area thoroughly. Then loosen the matted fibers by scraping with a dull-edged coin. If the dent is deep, sponge the area with lukewarm water. Wait 15 minutes, then use the coin again.

YOU has been compiled from American Business, Business Week, Factory Management & Maintenance, and other sources.

From this 5-inch glass-coated billet come . . .

. . . these complex, special shapes in a . . .

New Engineering Material

Digested from *PRODUCT ENGINEERING*, July, p129

Engineers now have available to them in commercial quantities an old material in a new dress—low-carbon steel extruded to sections of intricate design. They will be able to fill many jobs with this new engineering material that can be supplied in highly complex shapes.

They have already put it to work in the manufacturer of business machines—for transfer levers, typewriter carriage rails, latch pins, magnet cores, panel-board frames. Machine-tool makers are designing it into such parts as cutter blades, fixture components, special cams. Electrical-equipment manufacturers are using it for pole pieces, rotors, pinions.

As design engineers become more familiar with the possibilities of low-carbon-steel extrusions, you'll find them specifying extrusions to replace castings, forgings, and intricate parts now machined from solid bar stock. You will not find such extrusions replacing rolled sections where large tonnages are required.

The engineers are finding these properties valuable:

- Extrusion close to finish dimensions, thus reducing the amount of finish machining.
- Cold drawing of extruded sections to finish dimensions, eliminating all machining.
- Improved physical properties from hot extrusion and cold drawing.
- Surface finish that requires no mechanical cleaning.

The development of low-carbon-steel extrusions also makes possible the short-run production of rollable sections. The cost of an extrusion die is small compared to that of a set of rolls. Set-up is simpler. So the extrusions should be considered for pilot assemblies, experimental parts, and prototype work.

The hot extrusion process allows also production of hollow or solid unbalanced sections, which often are so complex that they cannot be rolled. In the past, the design engineer would have called for two or more parts, produced by some other method and fastened together. Now he can specify a single extruded section and save the cost and material of a joining operation.

Making the extrusions is not highly difficult; it waited on the discovery of a lubricant that would allow extrusion of ferrous alloys. Finally, it was found—powdered glass.

Billets in 6- to 20-inch lengths are heated in induction coils. They then roll down an inclined plane covered with powdered glass. Billets, coated with glass, are charged, one at a time, into the extrusion press.

One thousand tons of ram pressure then forces the hot steel to flow through the die opening. Pulling and twisting the extruded section takes out the kinks and bends. Cutting to length and shot blasting finish the process. The product has a smooth, dull, silvery appearance with a slight open surface—far superior to the looks of hot-rolled bars.

Should You Generate Power . . . Or Buy It?

Digested from *POWER*, July, p82

If you are building a new plant, or expanding an old one, the question of power supply must be answered. Should you make your own steam and electricity? Or should you buy power from an outside source? One thing is sure; you will want a steady and dependable supply. Power failures cost money.

First step in deciding whether to buy or generate is to determine your exact needs. That means a detailed study of steam and electrical power-load curves for your plant. If you are dealing with a new plant, with new processes and equipment, you will have to develop new load curves, including those for average, peak and seasonal loads.

It may be necessary to make daily and even hourly load curves if your power use within short periods varies greatly. Determine your needs first.

The next step is to take a close look at fuel costs in your community—for coal, oil, or gas. Compare these with the cost of purchased electricity. Assuming the outside power is good in quality and is reliable, you have a purely economic problem.

If your plant requires electricity only, you will probably find it difficult to justify spending money for private power generation. However, if your plant needs both steam and electricity, then there is the opportunity to generate by-product power—with extraction, mixed-pressure, or backpressure turbines. In this case, it may be cheaper to generate your own power, assuming you can either use the by-product power yourself or sell it to other users.

Additional cost factors enter into the balance, of course—labor, maintenance, replacements, depreciation.

Labor cost, per unit of energy produced, is somewhat higher for small privately-owned power plants than for big utility company plants. One man can operate a 50,000-kilowatt machine just as easily as he can handle a 2,000-kilowatt machine.

Maintenance costs are within the same range for both small and large plants. The same is true of supplies, though they are relatively minor.

Replacement costs—if extended on the company's books over a long period of time—do not amount to a big expense when figured on an annual basis.

Depreciation is defined as that part of any capital investment—such as a power plant—that is "written off" or discharged on the company accounts each year. Power-plant equipment has a long life. Boilers and generators often last 30 to 50 years. Businessmen who may be anxious to "write off" capital equipment within only a few years should bear this in mind.

Return on investment will also influence the decision either to buy or generate power. Management must decide if the investment in equipment brings a reasonable return as compared with investing the same amount of money in production facilities.

The idea, of course, is to hold down the power-plant investment to a low minimum. It will then compare better with investments in production equipment. Some points to remember:

1. Keep the design simple; use as few components as possible.

2. Buy standard model boilers, generators, etc., and shop-assembled units.

3. Locate your power plant close to where the power is used, if possible, to reduce transmission costs and waste.

4. Burn the cheapest fuel available in your locality. Do not forget that fuel-handling and ash-handling equipment are big cost factors—especially if you use coal.

Geography, too, is a point to consider. If fuel costs are low in a particular area, then private power plants in that area are generally in a favored position. But do not rely upon this conclusion. The size of your plant, your distance from the utility's power station, "load-area" concentration, the location of substations in your vicinity—all these and other items can greatly affect your situation.

Load factor is a final major point. For example, if you operate an 8-hour working day, and a 5-day working week, your load factor is low. That means the unit cost of purchased electricity will be high.

But the private power plant, unfortunately, is also at a disadvantage in these circumstances. Its unit operating cost is low, but the power it generates is also low.

The final answer does not always amount to a clear choice between purchased and generated electricity. For best economy you may want a combination of both. This might include partial generation, utility standby, interchange of power during off-peak periods. It is a question of discussing all possibilities with competent utility engineers.

➤ NEW

Digested from *CERAMIC INDUSTRY*, July, p85

New coatings protect metals and nonmetals against erosion up to 3000°F. They are crystalline refractory compounds developed by Norton Co. Use will be in rockets, guided missiles, other extra-high-temperature equipment.

The new Rokide coatings differ from ordinary high-temperature enamels: (1) three to five times the operating temperature; (2) somewhat more porous and therefore less resistant to oxidation; (3) essentially crystalline.

Rokide coatings are made by fusing a solid rod and blowing the molten materials against a cool surface where they solidify. The coating materials must melt and form droplets, not threads. One of the most successful has been aluminum oxide, applied by a metallizing gun.

Oxyacetylene gas feeds through an annular tube to the nozzle of the gun. There it burns at a temperature over 5000°F. The aluminum oxide rod is fed, at a fixed rate, into the flame. As the oxide melts, compressed air from the annular tube applies the molten material.

Other coating materials being studied include zirconia, zircon, titania, and porcelain. Zirconia coatings may prove to have three to four times the insulating value of aluminum oxide.

Precision built easy to handle
HITACHI POWER SHOVEL
does big jobs fast

Hitachi's Power Shovel has not only been in extensive use in Japan but also been exported and it has given full play to its distinctive features, such as the solid structure, precise work, swift operation and the ease in handling, in the dam construction and other development works.

Hitachi's Power Shovel is composed of the travelling part, slewing part and the front part installed in the front and by changing the front it can be easily modified to Pile Driver, Caterpillar Crane with Hook, Caterpillar Crane with Bucket and Skimmer.

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Electric Tools

$70-MILLION LOAN, with $15.8-million for new chemical plants, will go far toward boosting agricultural, industrial, and electric output in southern Italy

Another Example of the
World-Bank's Success

Digested from *BUSINESS WEEK*, June 18, p152 and *CHEMICAL WEEK*, July 2, p24

As it enters its tenth year, the International Bank for Reconstruction and Development (usually called the World Bank) can look back on nine busy years. And the busiest was the last—the biggest ever for this finance corporation, credit union, and economic adviser to its 57 member nations.

Here are highlights of the past year's lending activities:

- Recent loans to Italy, Austria, and Colombia bring the fiscal's year lending to over $400-million, the total to $2.3-billion.
- Earnings reached $24-million for the year, up 20%. This makes Washington wonder whether the bank should pay its first dividend, but it makes borrowers clamor for lower interest rates. Both will probably be disappointed.
- Private investors in the U. S. and abroad are taking a more active part. The Bank of America took $5-million of the Italian loan.
- Hundreds of bank-financed projects are increasing the productive capacity and living standards of member nations.

Let's take a closer look at the Italian loan to see how World Bank loans work. It's the biggest loan that the bank has made in Europe. The $70-million will go to Cassa Per Il Mezzogiorno Co., the government agency charged with piloting projects to boost living standards in areas south of Rome.

These five chemical plants illustrate how the loan will provide new job opportunities, stimulate private investment, improve Italy's export position:

1. Paper plant at Avezzano to make each year 28,000 tons of newsprint and magazine, medium-grade and fine paper.
2. Pharmaceutical plant at Palermo to produce a wide range of drugs and insecticides.
3. Cement plant at Palermo to make 132,000 tons a year.
4. Fertilizer plant at Catania to deliver 55,000 tons a year of compound fertilizers.
5. Another fertilizer plant, near Syracuse, to produce 110,000 tons a year.

Where else has World Bank money gone? To Pakistan, Mexico, Brazil, Thailand for railroads; Panama, Chile, India for farm development; Japan, Mexico, Brazil, Nicaragua for power; Holland for airplanes; Iceland for a radio transmitter; Peru for port equipment.

As a rule, the loans are basic to the nation's development. In 9 years, electric power (at $589-million) and transport (at $543-million) have received the most money.

But the bank provides more than money. It sends survey missions to study national economics. In June, it entered its first technical assistance contract, at a fee, to provide Iran with engineers and advice. And in January, it will open an Economic Development Institute to train picked officials from member countries in the fundamentals of progress.

Money into London

. . . has flowed in large amounts from foreign sources lately. High interest rates are the reason

Digested from *THE ECONOMIST (LONDON)*, June 4, p867

Since February, London has been offering higher rates for money than any of the major international money markets. The result has been a heavy movement of foreign funds into the British capital.

American, Canadian and Continental banks have been switching short-term funds into London. There they can earn up to 3¼% by investing in British Treasury bills. The yield on U. S. bills is only about 1½%.

A typical operation works this way: A Canadian bank holds maturing U. S. Treasury bills, and finds that it would get a better return on these short-term funds if they were moved to London.

Therefore, instead of renewing the U. S. bills, the bank buys spot sterling and pays for it with the dollars released by repayment of the bills. It then invests the sterling in British Treasury bills. Even after paying a premium to secure its dollars at the end of the three-month term of the British bills, the bank is able to earn about 2% net on its London investment.

At the end of three months the bank will again be in possession of its dollars, and will have improved the yield on its short-term funds without running the slightest exchange risk.

How much money has been attracted by London's higher interest rates? A fair guess is £50-million of short-term funds—shifted from overseas. But there are some observers who say this figure is far too low. The total remains pure guesswork.

As to the near-term effect of this incoming money on the British dollar reserve, there is little doubt. The foreign money immediately causes a demand for spot sterling and therefore helps to strengthen the reserve.

But the benefit is apt to be only temporary. It tends to be canceled out by later transactions.

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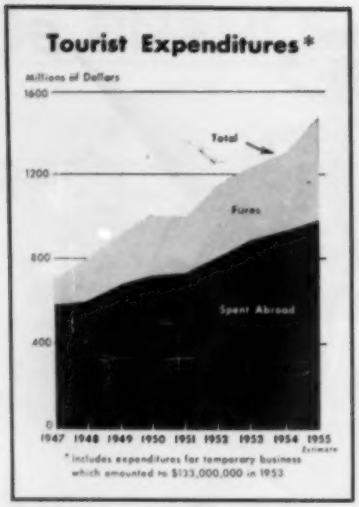


Dollars Abroad

Digested from *BUSINESS WEEK*, July 9, p154

American tourists this year are expected to spend more money than ever before for traveling to foreign countries and sojourning there. U. S. Secretary of Commerce Sinclair Weeks recently estimated that they will spend a record $1.5-billion. This will be a rise of 10% over 1954 and 50% over 4 years ago. Out of the $1.5-billion, Americans will spend about two-thirds in the countries they visit. The remaining third will go for travel, nearly half of which will be by foreign carriers.

Brazilian Switch Deals Available In Europe

Digested from *AMERICAN LETTER*, July 9

New triangular trade opportunities for Brazilian goods are springing up throughout Western Europe. Exporters in Brazil will want to explore their chances. Their first step is to find out in which countries Brazil has exchange balances. Banco do Brasil does not object.

A surplus of Brazilian-owned Spanish pesetas was behind several recent transactions in which U. S. machinery was shipped to Brazil. Turkish pounds and Belgian francs also have been used recently. France will issue licenses for "switch" transactions involving Brazilian raw or refined sugar. Essential oils and cotton can be shipped from Brazil to Yugoslavia, with payment in dollars.

▶ FINANCIAL DIGEST

American capital—from private sources—will be moving your way in bigger amounts before long. Three current developments indicate this:

• **An Office for Foreign Investment** has been set up by the U. S. Department of Commerce. The idea is to help U. S. businessmen find new investments abroad. Write to OFI, Department of Commerce, Washington 25, D. C., for details on obtaining American capital.

• **The International Finance Corporation,** to provide joint capital with private investors, will win U. S. congressional approval. The U. S., acting cooperatively with other member nations of the World Bank, will supply a share of $35-million. This will mean an additional $70-million of American overseas investment each year.

• **Double taxation** of income earned abroad will be avoided, mutually, by a treaty late this year between the U. S. and Honduras. It will be the first such treaty with a Latin American country. Other Latin treaties will follow without delay—and thus encourage greater U. S. investment in Central and South America.

✦ ✦ ✦

West Germany's economy, especially in banking, seems headed back toward the rigid monopoly system that dominated the nation's industry for many years prior to World War II.

The Germans, among other things, are going to reestablish their centralized banking system—the Grossbanken family, or "big bank" family. It was broken up by occupation officials in 1945.

A new banking law is due to be drawn up shortly. It will make possible the regrouping of the "big three" German banks—the Deutsche Bank, the Dresdner Bank, and the Commerzbank—into an all-powerful financial unit that is certain to control large segments of German industry and commerce.

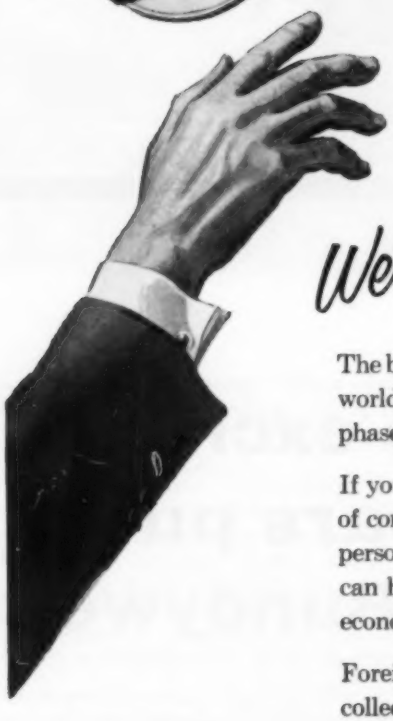
✦ ✦ ✦

Britain's economy is being drawn tighter and tighter on the homefront to improve the nation's foreign-trade balance and gold and dollar reserves. The idea is to reduce consumption at home—to import less—and, at the same time, be in a position to export more.

Bank and interest rates were increased last February in an effort to curtail credit (and consumption) within Britain. Three new measures have been added: (1) a close control over installment buying, (2) a strong plea to banks to cut way down on bank credit, and (3) a plan to decrease many forms of government spending.

The indication is that convertibility of the pound is further away than was expected even a month or two ago. Europe must wait.

Financial Digest, compiled from various sources, analyzes current financial trends and underlying factors.



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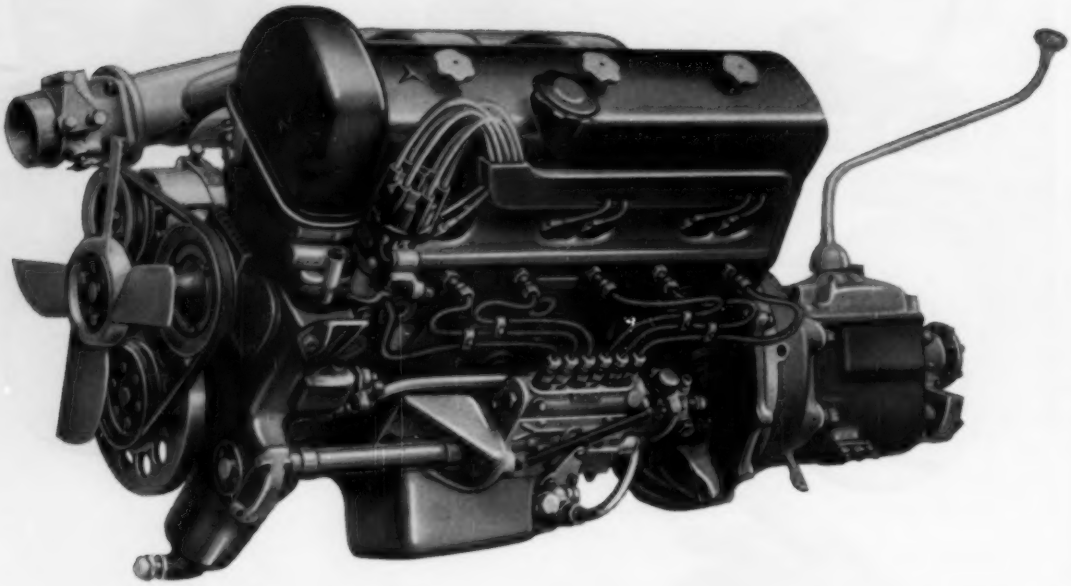

Above, engine of *Mercedes Benz Type 300SL* sports car, shown on opposite page. Bundyweld Tubing is used in this car. Bundyweld's wide acceptance in the foreign car market can be attributed to the same dependability which has led to its use in 95% of today's cars, in an average of 20 applications each.

Europe's exciting sports cars put faith in Bundyweld

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← NOTE the exclusive Bundy-developed beveled edges, which afford a smoother joint, absence of bead, and less chance for any leakage.

Mercedes Benz Type 300SL, a fast, sleek, precision-built car, is manufactured in Stuttgart, Germany, by the Daimler-Benz Company, the world's oldest automobile manufacturer. It weighs approximately 2,800 pounds and has a maximum speed of 165 miles per hour.

Europe's sleek, glamorous sports cars back up their superb styling with astonishing records for dependability-plus, under the most grueling performance tests.

Part of the reason for this record for dependability lies in the fact that many of these precision-built sports cars use leakproof Bundyweld Tubing for hydraulic brake lines, oil lines, petrol lines, other important uses.

European car manufacturers, like American auto makers, have learned that they can always rely on Bundyweld Tubing. Here's why:

Bundyweld is leakproof by test: thinner walled yet stronger; can withstand heavy vibration fatigue, punishing wear; has high bursting strength; takes easily to standard protective coatings. It's the only tubing double-walled from a single metal strip, copper-brazed throughout 360° of double-walled contact.

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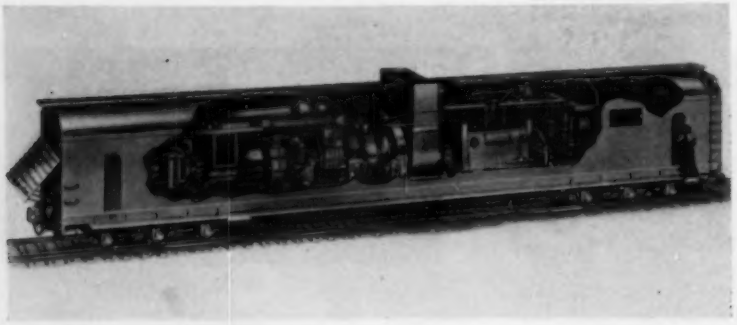
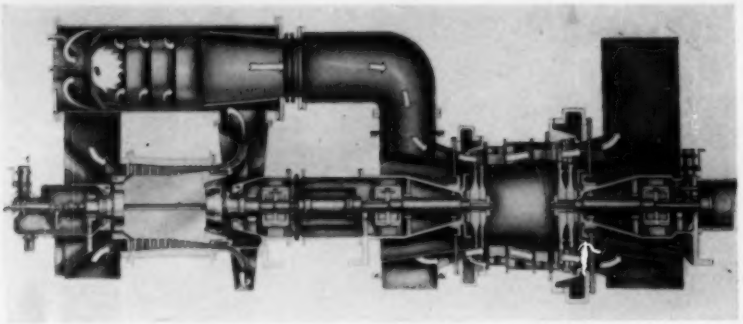
NEW PRODUCTS

Inside New Mobile Power Plant



Inside the Gas-Turbine Prime Mover



Power Plant Rides Railroad Car, Supplys Emergency Electric Power

Designed specifically as a compact, mobile source of a large amount of electrical power, the Turbo-Mobile Power Plant is mounted in a single railroad car. A newly designed combustion gas turbine, directly connected to a generator, develops 5,500 kilowatts of electrical power. The power plant requires connection to fuel and transmission lines only. Everything else for this mobile plant is completely self-contained.

The unit can supply power in any area. All parts are shock-proof mounted. It is suitable for normal railway speeds of 60 miles per hour and will be operating at full load within hours after arrival. One operator can start and run the plant or the unit may be modified for remote operation.

The power plant operates on a wide range of liquid and gaseous fuels, in combination or interchangeably. Dual fueling may be employed without changing any burner parts.

Two major elements connected by a flexible duct make up the power plant. The first element is the axial compressor and a turbine. The second element is a generator and a turbine driven by exhaust gases from the first turbine. There is no mechanical connection between the two turbines. Each element is mounted on three points in the railroad car to maintain alignment of the unit independent of car flexure during travel.

The air-cooling system assures rapid trouble-free starting and stopping. Low operating temperatures assure long, continuous service life. Water is not required. **(Clark Bros. Co., Div. of Dresser Industries, Olean, N. Y.)**

Pipeline Ditcher

The Buckeye 308 is a heavy-duty, wheel-type ditcher for digging cross-country ditches and for city gas, water, oil, sewer, conduit and cable lines. It digs to a maximum depth of 5½ feet with optional width of cut varying from 16 to 32 inches. The ditcher is fast and flexible in all types of soils.

A live hydraulic wheel hoist provides fast and accurate positioning of the digging wheel. Shock damage to the soil discharge conveyor is eliminated by a hydraulic drive instead of a mechanical drive from the digging wheel. **(Gar Wood Industries, Inc., Wayne, Mich.)**

●

Six-Ton Hydraulic Crane

A new crane for materials handling has a low center of gravity for exceptional stability and a new-design hydraulic system that reduces downtime. The crane has all drums on the same level to give the machine the extra stability required for the wide range of materials-handling jobs it does.

Mounted on a rubber-tired carrier, the crane will handle a 6-ton load. It can also be mounted on any 2½-ton truck or 20-inch crawler. It is equipped with a standard 25-foot boom. Boom inserts, 5 and 10 feet long, are available. **(Dixie Crane and Shovel Co., Inc., 2343 N. 7th St., Harrisburg, Pa).**

Dry-Coats Tablets

A tablet-within-a-tablet machine makes it possible to sugar-coat penicillin or to protectively coat other active ingredients. Such dry-coated tablets disintegrate more rapidly than tablets coated by other methods.

The new machine produces tablets compressed from dry powder around the core tablet of the active ingredient up to ½ inch in diameter at rates up to 500 per minute. **(F. J. Stokes Machine Co., Inc., 5500 Tabor Road, Philadelphia 20, Pa.)**

•

High-Volume Pumps

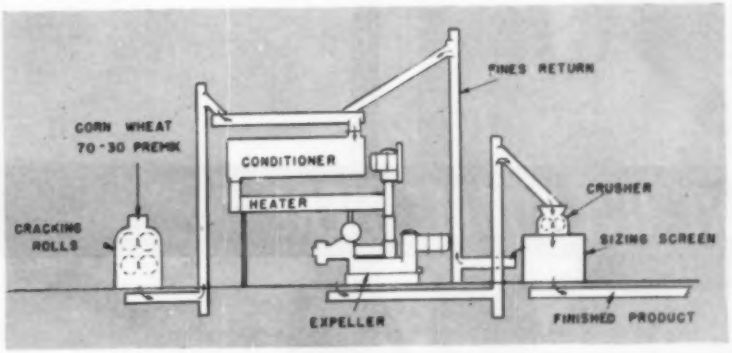
A new series of pumps has been designed for irrigation by ditch or flood methods and for pumping from surface-water supplies. The low-pressure, high-capacity centrifugal pumps may be used on suction lifts up to 20 feet. They are available as portable engine-powered units, as pump ends adapted for belt drive, or with base and coupling direct-connected to electric motors. Thus the customer has a wide selection of drives to choose from.

Sizes are 6, 8, 10, and 12 inches with capacities up to 6,000 gallons per minute. Pumping is done by means of a "mixed flow" impeller delivering large quantities of water at low discharge heads. **(Marlow Pumps, Ridgewood, N. J.)**

Centerless Grinder

Small-sized, general-purpose centerless grinding machine, No. 0, is designed for a wide range of metallic and non-metallic parts ranging up to ½ inch in diameter. The low power consumption, reduced floor space, and low capital investment required by this machine make it an extremely efficient, low-cost producer of small shafts, drills, pins, clock parts, and instrument parts. Multiple-segment bearing supports the grinding-wheel spindle rigidly on wedged-shaped films of oil.

All electrical motors are completely enclosed within the machine to protect them from dust, grit, and cutting fluid, yet they are easily accessible for servicing. A 5-horsepower motor drives the grinding-wheel spindle. **(Cincinnati Milling Machine Co., Cincinnati 9, Ohio.)**



Process Makes Cereals More Digestible

The new Grain Expanding Expeller Process completely converts starch grains such as corn and wheat to a highly digestible carbohydrate form. The finished product is uniformly tender, crisp, and palatable. Externally applied heat plus internal frictional heat turns the moisture inside each grain into countless tiny steam pockets. The expanding steam creates the lightweight product. An average of a ton an hour of corn can be converted. (V. D. Anderson Co., 1935 W. 96th St., Cleveland 2, Ohio.)

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B-52 wings get a lift

This huge press, installed at Boeing-Wichita where it produces inner skins, wing stiffeners and similar components for the B-52, has *three* features that are proving a boon to cost-conscious Boeing engineers and taxpayers alike:

- Its tremendous power allows Boeing to *heat-treat parts prior to forming*—giving them the added strength they need.
- The rubber pad slashes tooling time and costs—a significant advantage in short-run production.
- The two die slides boost output: while one is in the press, the other is loaded.

Like *all* Bliss Hydro-Dynamics, regardless of size, this press is fast starting, quick on the approach and return (300″ per minute). Its controls are simple, and operation foolproof.

If you believe that a hydraulic press may solve your production needs, let a representative give you the benefit of Bliss' experience. Since Bliss manufactures a complete line of hydraulic *and* mechanical presses, you can be sure of an impartial recommendation—a recommendation that results in the one *right* press for the job.

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WILL FORM LARGE METAL PRODUCTION PARTS FOR B-47'S AND B-52'S
WEIGHT 500 TONS
INSTALLED COST COMPLETE IT $499,790
BLISS

TWO STORIES HIGH, this press is essentially a single action press of open-rod "moving down" construction, with the slide guided on all four rods. Despite its mass, however, it can be precisely controlled: the operator can inch the slide to the work and stop it at any point in the stroke.

THE MACHINE TOOL SHOW

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Representatives throughout the world

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E. W. Bliss Co. (Paris) France

▶ NEW COMPONENTS

New Silicon-Carbide Components Work Where Ordinary Metals Fail

Many a chemical engineer faced with an exacting materials-of-construction requirement has looked at silicon carbide longingly—only to discover that it could not be made in the desired shape. Conventional mixtures of silicon-carbide granules and bonding agents just cannot be worked into small and complicated shapes prior to firing in a kiln.

What is opening industry eyes about newly-available Refrax silicon-nitride-bonded silicon carbide is the wide range of precise, intricate forms in which it can be made. Parts include spray nozzles with internal fins; pump housing and impellers; threaded parts and nuts.

Outstanding among the traits of Refrax parts is the fact that most properties are retained up to, and in some cases beyond, 3,000°F.

Refrax parts can be formed within tolerances of ±0.005 inch. They will retain their dimensions and shape, even after they have been used a long time at the indicated temperature range. Add to this a smooth, close-grained surface texture and you have the possibility of operating moving parts at high temperature.

From moderate to extreme temperatures, Refrax parts are not affected by most acids. Even corrosive slags and highly-reactive materials such as molten synthetic mica do no harm. Mixed chlorides and the sulfates of iron, zinc, and tin, containing free acids, are handled without damage. Strong alkalis will damage Refrax.

On two other grounds Refrax out-performs previous high-grade silicon-carbide refractories. One is better resistance to rapid temperature changes and conditions that promote high thermal gradients. The other is better resistance to rubbing and impingement abrasion.

Silicon carbide granules in Refrax are held together by a near-metallic type of bond rather than the siliceous bonding agents normally employed. In the older types the bond is physical; the particles are locked together by fused films of bonding agent.

In Refrax the bonding agents actually undergo a chemical transformation during the firing operation. The original bonding material combines with the atmosphere to form a tough bond of a different chemical composition. **(The Carborundum Co., Niagara Falls, N. Y.)**

Recording Instruments

New direct-acting recording instruments will simplify maintenance and operation. They will provide improved reliability and permit substantial reductions in space requirements.

The recorders, known as the type 44 line, are available as ammeters, voltmeters, wattmeters, varmeters, and frequency meters in models for portable use or for flush or projection switchboard mounting.

Use of a unique self-contained forward-tilting chart drive mechanism permits adjustments and maintenance to be made entirely from the front without removing the instrument. **(Westinghouse Electric Intl. Corp., 40 Wall Street, New York 5, N. Y.)**

●

New Pipe Insulation

A new pipe insulation, known as Fiberglas White Dual Temperature Pipe Insulation, combines maximum insulation efficiency and condensation protection for lines at temperatures from 120° to 250°F. A factory-applied vapor barrier prevents condensation and provides an attractive surface that does not need painting under dry conditions.

The pipe insulation will fit all standard sizes of pipe to 33 inches and copper tubing to 6 inches. It is fastened in place with metal bands. **(Owens-Corning Fiberglas Corp., 16 E. 56th St., New York 22, N. Y.)**

Racing Type Tire

A new racing type tire has unusual stamina. It is designed to meet the trend towards higher horsepower, especially in current sports model cars. It is original equipment on the Chrysler 300.

The "Blue Streak" tire is built with all-nylon, triple-tempered (3T) cord and manufactured in both tubeless and tubed versions. **(Goodyear Tire and Rubber Export Co., 1144 East Market Street, Akron 16, Ohio.)**

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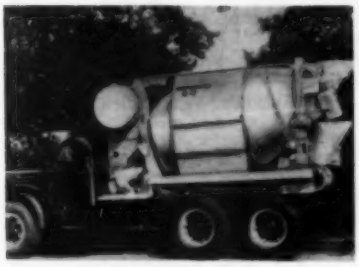

Truck Mixer for Concrete

The new HI-UP truck mixer features a heavy-duty, single-lever transmission, forward and reverse clutches, and drum and brake gears totally enclosed in a continuous oil bath. A new-style distributing chute extends approximately 8 feet when a hinged chute is open and over 11 feet with the extension chute.

New die-formed "sure contour" blading provides proper mixing in a minimum charging time and rapid discharging on even the most difficult slumps. **(Worthington Corp., Harrison, N. J.)**

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Typical of the machine tools that have made the Ex-Cell-O name famous are its machines for precision boring, turning and facing. The Ex-Cell-O Style 1212-A Machine shown handles small and medium size parts and can be tooled for small or large volume work. One or more precision spindles can be arranged on each machine bridge. Controls of the hydraulically operated machine table are easily adjusted for an automatic cycle which may include rapid movement, two infinitely adjustable feed rates in both directions of travel, immediate or dwell reverse and stop.

This and many other Ex-Cell-O products are fully described in Catalog 27312. Use the coupon below to get your copy.

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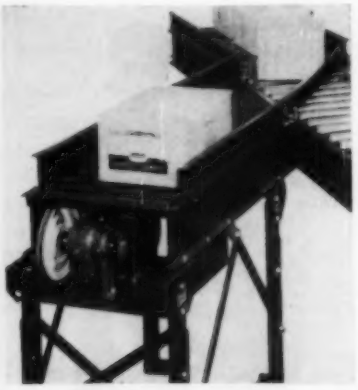

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Polyethylene Wax—Epolene, an inexpensive, convenient-to-use synthetic polyethylene wax, is suggested for application in melt coatings of the kind used on bread wraps and milk cartons. An outstanding property is its ability to plasticize other waxes. **(Eastman Chemical Products Inc., 260 Madison Ave., New York, N. Y.)**

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Clutch and Brake—New combination air friction clutch and spring-released brake for crankshaft mounting requires only a single valve for operation and control. Heating problems are practically eliminated because it does not have to start and stop back gearing. Existing flywheels need a minimum of machining for use. **(E. W. Bliss Co., 1420 Hastings St., Toledo 7, Ohio)**

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Fluid Resists Fire—Two new hydraulic fluids resist fire. Pydraul 150, with a viscosity index of 170 and a pour point of −55°F., is designed for outdoor installations. Pydraul 600, with a viscosity index of 30 and a pour point of 15°F., is designed for use with presses, compressors, and die-casting equipment. **(Monsanto Chemical Co., 1700 S. Second St., St. Louis 4, Mo.)**

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Motor Valve—All-metal bellows-type motor valve, No. 992-D, has been developed for use as a final control element in pneumatic and hydraulic systems to maintain pressure, temperature, or level in industrial vats, tanks, and processes. **(Robertshaw-Fulton Controls Co., Sylphon Div., Box 400, Knoxville, Tenn.)**

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Refrigeration Equipment — Catalog CC55 contains information on air-conditioning and refrigeration equipment.—Acme Industries Inc., Jackson, Mich.

Automation — Standard, transfer and special machines equipped with mechanisms for automatic loading and unloading of workpieces are described in bulletin 50155.—Ex-Cello-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.

Diesel and Gas Engines—Bulletin 239 shows product and installation views, along with specifications and pertinent data on both series of Power Chief engines.—Nordberg Mfg. Co., Milwaukee, Wis.

Work-holding Equipment — Catalog 101 gives complete engineering data on "in-stock" sizes of check jaw blanks, handles, knobs, wheels, clamp assemblies, and components.—Jergens Tool Specialty Co., 712 E. 163rd St., Cleveland, Ohio.

Rock Drilling—Catalog 4164 describes new rock-drilling machine designed to provide larger and deeper blast holes more efficiently and at less cost.—Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.

Fighting Fire—Complete information on Kidde pressure-operated carbon dixoide fire extinguishing systems is given in bulletin 1-15B-20M-1.55 ADV.—Walter Kidde & Co. Inc., Belleville 9, N. J.

Materials Handling—Catalogs D-339, 60-343, and 68-344 cover several thousands different casters and wheels, a wide variety of trucks and trailers, and powered lifters, lift trucks, and tables.—Colson Corp., Elyria, Ohio.

Hydrospinning—Bulletin M-1873-2 contains information on Hydrospinning, a power forming process in which a workpiece is forced to take the shape of a rotating mandrel.—Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

Industrial Floor Sweeper—Bulletin 85.2 contains detailed information and specifications on model 75 heavy-duty power sweeper.—G. H. Tennant Co., 2530 N. 2nd St., Minneapolis 11, Minn.

Lifters—Bulletin SL-28 tells how C-F lifters are solving more materials-handling problems. They provide an economical, efficient and more flexible method of handling materials and equipment.—Cullen-Friestedt Co., 1300 S. Kilbourn Ave., Chicago 23, Ill.

Drills and Reamers — Booklet "Drill And Reamer Facts" describes and illustrates the design and construction of twist drills and reamers. For your copy, write on your company letterhead.—Whitman & Barnes, Plymouth, Mich.

Shell Molding—Fully integrated, automatic shell molding system capable of producing up to 240 quality molds per hour is described in book 2462.—Link Belt Co., 233 Broadway, New York 7, N. Y.

Absorption Refrigeration — Absorption refrigerating machines, which produce large-capacity cooling from steam, have no moving parts, and use plain water as a refrigerant, are described in catalog 30-F-22.—Carrier Corp., Syracuse, N. Y.

Conveyors—Complete information on bulk conveyors for handling coal, ashes, sand, gravel, stone, chips, aggregate, and logs is given in bulletin 4551.—Jervis B. Webb Co., 8951 Alpine Ave., Detroit 4, Mich.

Conductor Accessories — Booklet provides information for selecting and installing accessories needed with aluminum wires and cables in the construction of electric transmission and distribution lines.—Reynolds Metals Co., 19 E. 47th St., New York 17, N. Y.

Hollow-shaft Motors — Construction features of open-type vertical hollow-shaft motors for outdoor service in ratings from 2 to 125 horsepower are described in bulletin 51B7900. — Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

Capacitors — Booklet B-6136 provides maximum aid to users in selecting the best power capacitor for every application.—Westinghouse Electric International Corp., 40 Wall St., New York 5, N. Y.

Revolving Crane—A radically new self-propelled diesel-electric revolving crane is described in bulletin 661-3-5.—R. G. LeTourneau Inc., 2399 S. MacArthur, Longview, Texas.

Aluminum Finishes — Book entitled "Finishes of Alcoa Aluminum" effectively illustrates the many ways in which the beauty of aluminum can be enhanced. For your copy, write on your company letterhead. — Aluminum Co. of America, 762 Alcoa Bldg., Pittsburgh 19, Pa.

Flow Meters—Bulletin 285-G-2A contains information on pneumatic flow meters for providing the accurate, dependable flow metering required for efficient operation of water and sewage plants.—Builders-Providence Inc., 345 Harris Ave., Providence, R. I.

Precision Lathe—The new Sebastian 15-inch geared-head lathe is completely described in new bulletin 3255.—Sheldon Machine Co. Inc., 4258 N. Knox Ave., Chicago 41, Ill.

Tractor-Shovels — Design, construction, operation, and correct application of 1 cubic yard capacity Michigan '75' tractor shovels are described in catalog 7500-P. — Clark Equipment Co., Benton Harbor, Mich.

Centrifugal Pump — Bulletin 310 describes the mechanical features, types and sizes, materials of construction, applications and advantages of the Type L corrosion-resistant chemical pump.—Dorr-Oliver Inc., Barry Place, Stamford, Conn.

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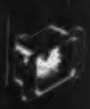

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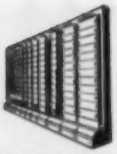

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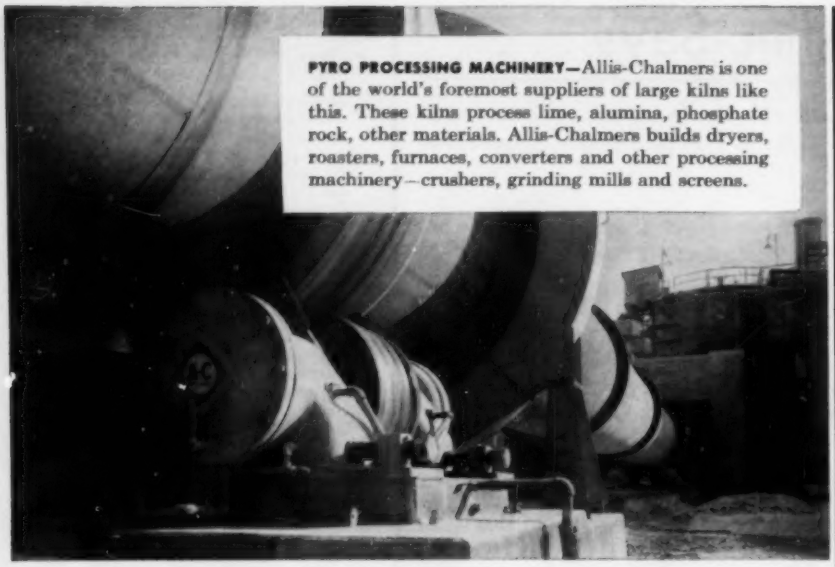

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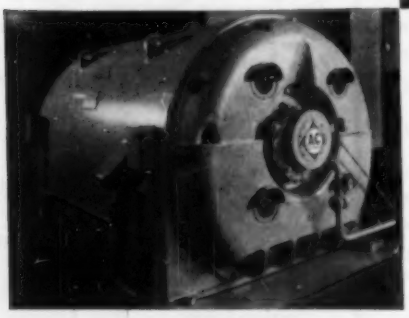

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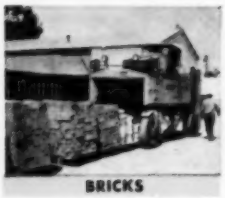
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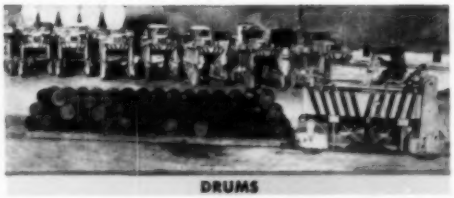
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